

COAL AGE

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Open Production Costs

BY R. DAWSON HALL



ALL signposts point to lessened secrecy in business. Years ago the seller kept his prices tucked with his watch in his vest pocket. Now he wears them both on his wrist and furnishes the public with the selling price of his product with as little hesitation as he announces the time of day. Yet in times past so secret were his prices, and so variant, he barely let his clerical force learn what they were. In those times even railroad traffic rates were matters of profound secrecy and private dicker.

Then came a period when a certain openness was affected as a concession to the public demand for an equality of treatment between consumers. But still the railroads had their rebates and merchants their private discount sheets. Consequently, actual prices were hard to determine.

Today, in marked contradistinction, railroad rates are uniform and easy of ascertainment. To have a friend in the railroad service helps not an iota in securing a transportation rate, nor is a box of cigars the magical means it used to be in the placing of cars. The railroads have open tariffs, open mine-rating, and some at least a published car supply; and now the coal business even has its open-price record. The buyer can now, in most cases, tell the exact price at which coal from any particular section is being sold in any given market.

Some industries have stepped further into the light. In their own interests many corporations, notably those producing copper, have decided to give their production costs in some detail. They have sought thereby to show how cheaply copper can be produced under the conditions with which they are favored and under the methods that they have adopted. Yet it has been interesting to note that

despite the knowledge of the public that some copper was being produced at an extremely low figure, the price of copper all through the war was made uniform for all producers and was reasonably high. The public recognized that the low production cost was a tribute to efficiency and the outcome of business acumen, and hence was entitled to a reward. The copper business was left under self-regulation, whereas the coal industry, which has secret production costs and variant prices, was not allowed self-control and did not secure a uniform selling price.

It would be wrong to disguise the fact that the difference in treatment was probably due partly to the fact that coal is such a universal requirement that its low price is a matter for public clamor. It is not quite safe to argue from copper to coal, or from 1917 to 1925, or to assume that a product like coal, purchased largely by the small consumer and in such generous measure, will be viewed in the same way as is a product like raw copper, which is purchased mostly by the largest of corporations—by concerns, that is, which have from long experience a broader and more liberal point of view than the small consumer usually enjoys.

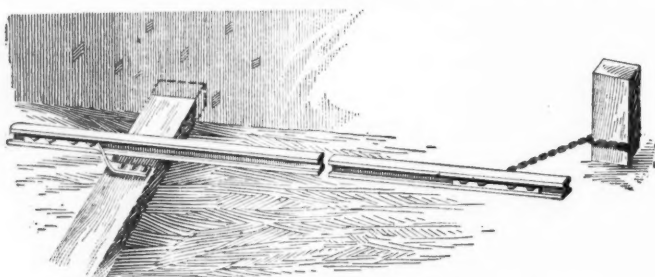
Dr. H. A. Garfield believes that the open publication of production costs is an assured way of averting public distrust and of allaying the growth of radicalism. Not a few corporation heads believe that he is right; others are equally convinced that such an open exhibit of the data of business would result in a public control as unfortunate to the consumers, the owners and their employees as has been the regulation of the railroad industry. COAL AGE would like to publish the views of its readers on this important problem. The time has come, if not for open production costs, at least for open expression of opinion on such matters of public interest.

IDEAS AND SUGGESTIONS

Preventing Track Rails from Creeping

BY RALPH W. MAYER
California, Penn.

Track rails on a slope or incline frequently have a tendency to creep downward or to buckle. A chain attached to one of the fishplate bolts, and fastened to a dead-man or anchored to a stump if on the surface, will hold the track in place. Another method is to weld an



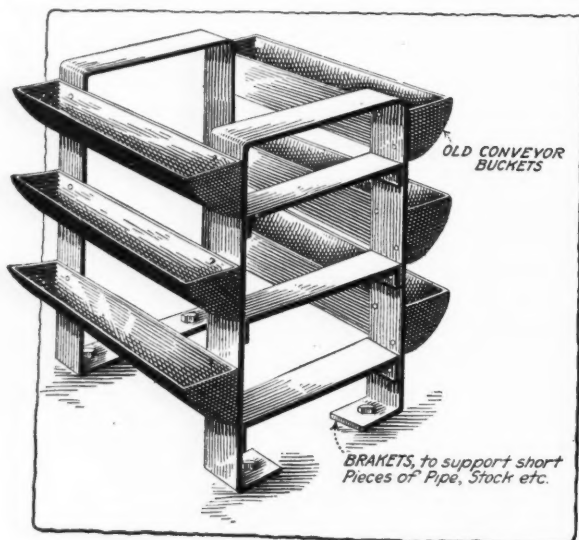
HOW TO KEEP TRACK RAILS FROM CREEPING

extension to the end of a fishplate, giving it a half twist and downward bend so that the welded extension will rest with its flat surface upon the tie (hitched into the rib) next above the fishplate. Holes are made in this piece, and it is firmly spiked to the tie.

Handy Catch-All

BY CHARLES H. WILLEY
Concord, N. H.

Instead of sending wornout coal-conveyor buckets to the scrap heap, and then disposing of them as junk, they can be utilized as catch-alls if made up as shown



DETAILS OF A PRACTICAL CATCH-ALL

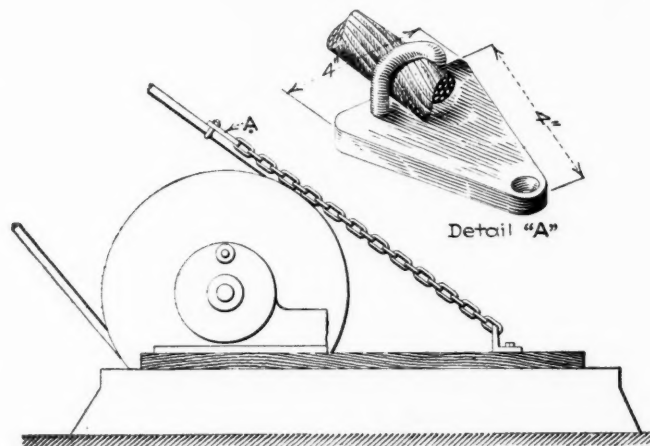
in the illustration. A description of the manner in which this catch-all is made is hardly necessary. Odds and ends of flat bars such as are used for braces and stays were employed in the manner indicated.

Method of Taking Up Slack Ropes

BY GEORGE BOWKER
West Frankfort, Ill.

The usual method of taking up slack ropes is to put something across the shaft, say two heavy rails, take off the rope, and cut away as much as is required; but in this method all the work is done at the end of the rope away from the drum. The process here described is accomplished by means of a chain having a piece of iron bent in the form of a knee, with a hole drilled in each leg. At the opposite end of the chain is another piece of iron made in the form of a triangle, having one hole in each apex (see Detail A).

When it is desired to take up the ropes the cager on the bottom is notified. He then places wooden blocks on the cage seats in the sump and notifies the engineer that all is ready. One of the nuts is then taken off one of the anchor bolts of the engine bed, and the end of the chain having the right angle iron attached is



DEVICE FOR TAKING UP SLACK IN ROPE

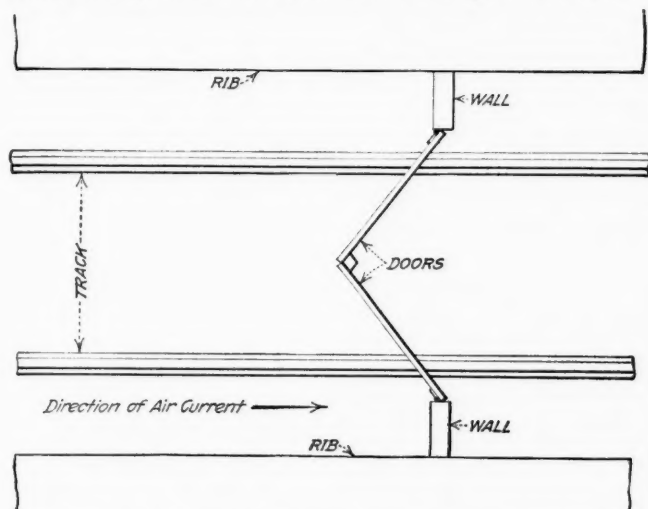
placed on the bolt and the nut screwed down. The other end of the chain is attached to the rope by means of a rope clamp. The clamp is attached to the rope, and before the nuts are put on the triangle plate is slipped on and secured. The rope is now fast and cannot move down the shaft.

The engineer then gives the engines a little steam, raising the other cage into the dump; and as the down rope is fast, the movement of the drum causes the rope to slacken. The brakes are now set tight and the assistant goes inside the drum, takes off the clamps, and by means of a small pinchbar pulls the desired amount of slack rope through the hole, puts on the clamps again, and all is ready to resume operation.

The method just described is simple and expeditious. I have helped the engineer perform this "stunt" quite a few times, and together we have taken up the ropes and been ready to resume operations again within 15 minutes of the time we commenced to take up slack. The accompanying illustrations show the arrangement.

Mine Doors for High Air Velocities

It is difficult to open a door against a strong air current. A double door such as that shown below can be opened more readily than a single door. The tops of the doors in this case strike against the door frame next to the roof, while the bottoms are caught on cleats on



EASY TO OPEN THESE DOORS AGAINST AIR CURRENTS

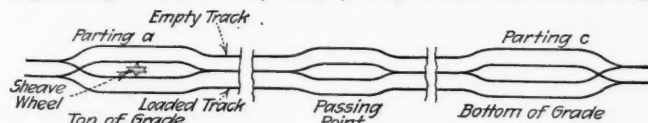
the floor. When closed the two doors form a V-shaped figure, the door frame preventing them from closing any farther than shown. Being set at an angle with the air current, the doors do not have to be opened wide to relieve the air pressure.

Wire Rope Assists Mule Haulage on Heavy Grades

BY W. H. LUXTON
Linton, Ind.

In the case of mule haulage in mines, unfavorable heavy grades against the load are hard on mules, are costly, and result in slow service. The following method of haulage saves mules and gains speed or time. Another advantage in the method proposed is that when mules become accustomed to such work and there is suitable means at both ends of the run, someone to unhook the mules, hitch them up again and start them out, then the driver can be discarded.

When the mules with the empties get to parting C, they can make the return trip to parting A with two cars, or trailers, as they are called. Three trailers are necessary, so that two be sent down from parting A to parting C with every empty trip while the remaining



ARRANGEMENT OF TRACKS TO FACILITATE HAULAGE

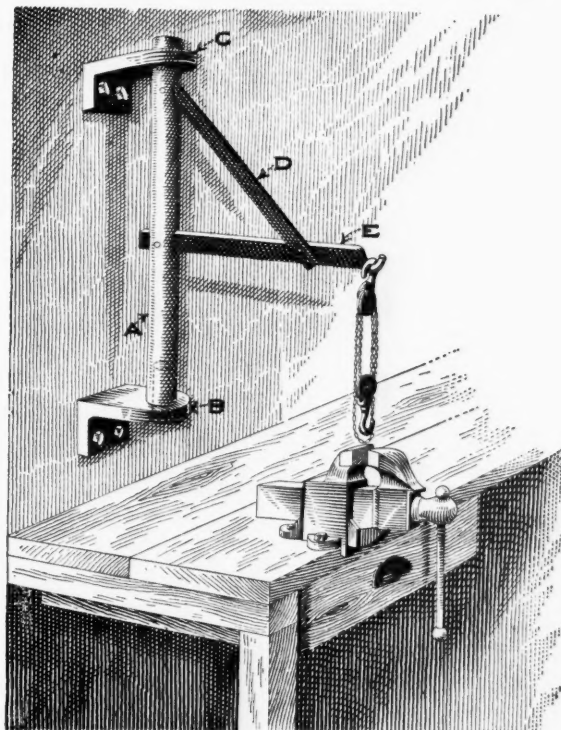
trailer is in use on the rope load. The passing point at the middle of the run is necessary to allow the empty trip and the mules to pass the rope load.

By referring to the accompanying diagram the arrangement of tracks will be understood readily. This system necessitates a double track or three-rail system most of the way; there should be a passing point for cars midway in the run in the event that a three-rail system is employed.

A light steel wire rope passes around the sheave wheel at parting A; when one end of the rope is at parting A the other end is at parting C. In practice, perhaps, the mule or mules can draw two loads on the grade in question, then hitch the rope to two loaded cars at parting C. In the meantime, hitch a mule or mules to four cars—two empty cars and two trailers—at parting A, also hitching the rope to the rear end of these empties. Now start the mules down the grade with the empty trip, at the same time hauling a trip of loads up the grade by means of the rope attached to the rear of the empties, passing around the sheave wheel and then to the front of the loads.

Wall Crane for the Bench

It is frequently necessary to lift a heavy piece of work from the floor to the work bench or vise, and if one cares to spend a few odd minutes to make a crane such as that shown below he can eliminate the heavy lifting. The device is simple to construct and is made from odd scrap stock of which plenty can be found about the shop. The upright A is made from a length



HOMEMADE CRANE FOR WORK BENCH

of old 2-in. pipe. The brackets B and C are made from pieces of flat strap stock. The top bracket simply has a large hole cut through it to take the upper end of the pipe, while the lower bracket has a piece of round stock set in it small enough to enter the inside of the pipe, as shown. This serves as a guide on which to swing the crane.

The diagonal brace and the horizontal arms D and E respectively are of bar stock. These pass through slots cut into the pipe and are pinned or riveted. A hook is formed on the end of the piece E to take a small tackle; this completes the apparatus. The device should be placed on the wall near the end of the bench so that it will serve the vise as shown and swing over the end of the bench to pick the work up from the floor.

Method Employed in Working the Crescent Mine

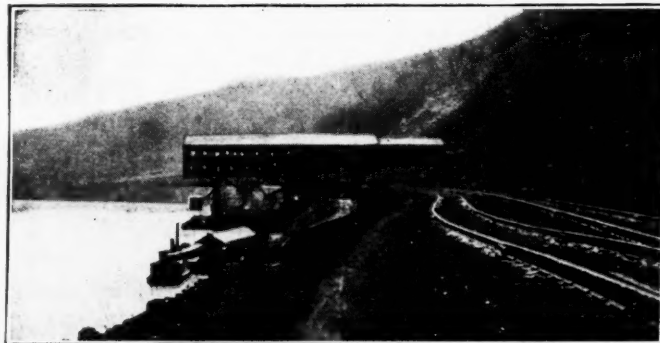
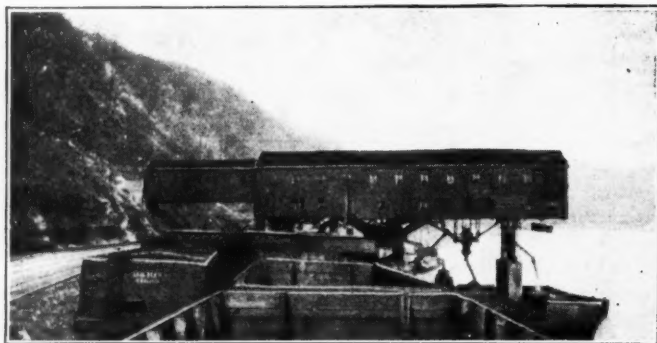
BY RALPH W. MAYER
California, Penn.

SYNOPSIS—*In a mine producing a large tonnage of coal a considerable aggregate area is worked out daily. Under such conditions great care must be exercised to prevent bringing on a squeeze. This is here successfully accomplished through the use of both machine and pick mining.*

THE Crescent mine at California, Penn., is the largest operated by the Pittsburgh Coal Co. Its output is about 6000 tons per day. Surrounding it are some of the largest mines in the world. Underground operations on such an immense scale over an extended area bring problems of their own, such as are not encountered in minor operations. One of these is the prevention of squeeze, or creep. The Pittsburgh Coal Co. has adopted a new and novel method of working which has proved highly successful. It has been in use

This 5-ft. pillar runs the full length of the butt entries. It is called a "liner," and helps to ventilate the old falls when the room pillars, or ribs, are drawn. Its size is so small that the roof will crush it, but it will still be air-tight and carry the air over the falls. As soon as the rooms are driven their full length, and up to the liner, a breakthrough, or crosscut, is made between adjoining rooms next to the liner. A breakthrough is also made through the face entry pillar into the adjoining room, next to the liner. These breakthroughs are called "bleeders," and allow the air to travel from the airway along the liner at the face of the room as well as pass from the butt entry up through the rooms. Efficient ventilation of all the falls in the room is thus provided.

The rooms are driven 24 ft. wide on 39-ft. centers and the pillars are 15 ft. wide. This gives 60 rooms to each pair of butt entries or 30 on a side. As the face entries are advanced the butts are driven off them 550 ft.



VIEWS OF THE TIPPLE AT THE CRESCENT MINE TAKEN FROM UP AND DOWN STREAM

for several years and has passed the stage of experiment. "Half advance and half retreat" is the name given to it.

The mine is worked on the five-entry system. The three middle entries are used as intake airways and the two side entries as returns. The middle of the five entries is used as the haulage road, it being an intake airway. These five entries are driven on the face of the coal and are called "face entries." The sets of face entries are driven 1500 ft. apart. The two side entries of the set of face entries have butt entries driven off them. The coal from both sides is pulled out through the middle face entry. The butt entries are driven on 550-ft. centers. The butts are driven 10 ft. wide, and a 50-ft. pillar is left between them.

Rooms are turned off both butts, 30 rooms on each one. The rooms on one butt are 250 ft. long and on the other 225 ft. long. The rooms from the right butt entry of one pair and the left butt entry of the adjoining pair are driven toward each other. A 5-ft. pillar is left between the face of the two rooms. The rooms do not break through into each other. A 6-ft. hole is kept in advance of the cut of the mining machine when the full length of the room has been nearly reached.

apart. The pillars of the face entries are left of ample size, so that no trouble will occur from that source.

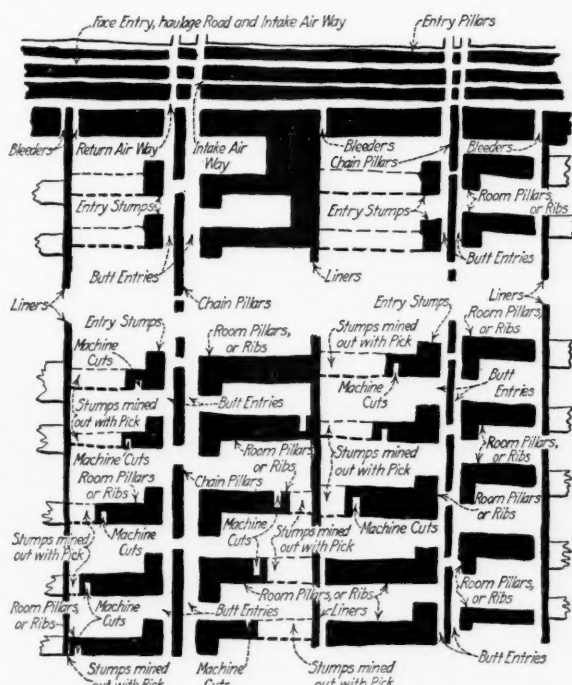
Rooms are turned off one of the butt entries as fast as it advances. No rooms are turned off the other butt entry of the pair until the butts are driven as far as they go. Then the rooms are turned from it at its inby, or face end, working back toward the face entry, or airway.

As fast as the rooms are driven to the liner the breakthrough is driven at their top, and the room pillar, or rib, drawn back. The rooms are advanced and the ribs drawn back so that the working faces of the different places make a diagonal line with the butt entry and the liner. This allows the roof to break better and no coal is lost. When the rooms of one butt are being worked the coal in the other is all in one solid block. After all the rooms have been started and most of the ribs drawn on the one butt, rooms are turned from the inby end of the other butt of the pair, and it is worked in the same manner as was the first butt. The entry stumps of the room pillars are left standing.

After the last room pillar of the first butt and several room pillars of the second have been drawn, the entry stumps are removed. The chain pillar is taken out at the same time. The second working follows immedi-

ately behind the first. The track that is used to drive the rooms is also employed to draw the pillars. The rooms are not allowed to stand idle, and there are no falls to clean up or timbering to do before work can be resumed. The roof falls behind the pillar drawing and takes the weight of the roof off the pillars, preventing them from being crushed into the floor. Two pairs of butt entries are usually placed on one air split, although this depends upon the number of men working on the butts. No timbering is used in the butt entries.

The rooms have two rows of props set in them. One row is set in the gob while the other is set close to the track. The props are set in pairs in this row, two props being set close together every 4 ft. Eight-foot props are used. The right side rib of the room is driven straight and the track is laid along it. This puts the straight rib and track on the outby side of the room of the first, or advancing, butt entry, and on the inby side of the room in the second, or retreating, butt entry.



METHOD OF UNDERGROUND OPERATION

This method allows the rib of the back adjoining room to be drawn without interfering with the next room ahead.

The rails of the room track are laid without ties. Channels are cut in the bottom coal left by the cutting machine and the rails laid in them. The rails are bolted together with fishplates. The 4-ton cars are hauled out of the rooms over these rails without difficulty. The motors do not enter the rooms but pull the cars therefrom by means of a reel and $\frac{1}{2}$ -in. cable. Armored chain cutting machines are employed. These are of the explosion-proof type and are operated by electric power.

These machines are used to undercut the coal in the room pillars, or ribs. A cut about 12 ft. wide is made into the side of the rib. This cut does not extend to the end of the rib, but 4 ft. of coal is left between the side of the cut and the end of the rib. This small stump, or pillar, is mined out by hand after several cuts by the machine have been loaded out and the rib has been broken through. A roof fall usually occurs as soon as the small stump has been removed.

A curved track is laid into the cut so that the car

can be placed close to the coal. The pick miner employed in this robbing must be an experienced man, so that he will remove the car, take up the track before the roof falls, and not get hurt himself. A steel car is worth at least \$150, and if a miner loses a few cars and some track he himself will be a losing proposition.

Only "pick" miners pull these small stumps, doing nothing else. They lose very few cars or rails. The "machine" miner loads the coal out of the cuts behind the machine, and a different price per ton is paid for the two kinds of mining. As soon as the pick miner has pulled the stump, the machine starts another cut, the same as the one before. A small 4-ft. stump is also left on the end of the rib to protect the machine loader and the cutting machine until the cut has broken through the rib. These small stumps are always removed by a pick miner before a new cut is started, so that there will be no small stumps in the gob to prevent the roof from breaking. All roof slate is gobbled on the side of the room which has been widened out opposite the straight rib when the room is driven. The accompanying illustration will help to make the method of working plain. The mine workings extend for about $7\frac{1}{2}$ miles back from the tippie, which is located on the Monongahela River. Coal is shipped by rail and water.

The Pennsylvania R.R. running from Pittsburgh to West Virginia passes under the tippie. The main haulage road is driven through the coal bed from the tippie back to the end of the workings. The seam is on approximately the same level as the railroad track, and an incline is necessary to raise the track from the elevation of the seam to dumping height. The tippie extends from the point where the short incline emerges from the hillside across the railroad track, and out over the river. Two barges placed side by side can be loaded at the same time from this tippie.

Early Views Regarding the Coal Supply of Great Britain

The chief mineral industry of Great Britain at the present day—coal mining—was practiced in the north of England and south of Scotland in very early times, says Davide Bowen, in a recent issue of the *Colliery Guardian*. Doubtless this was the case also in all the other coal fields; originally, working was confined to the outcrops simply or for short distances from the surface. In a charter of the year 1234 there was an indication of the existence of the Northumberland coal supply; while the Yorkshire coal field is first mentioned early in the following century. The leasehold system with royalties appears to have been common in the 14th century.

On account of the fear felt that the supply of coal might rapidly be exhausted if intensive exploitation were permitted, it was a frequent practice of the lords of the soil to expressly limit the quantity of coal which might be worked per day. It was the prevalent opinion that coal could only be worked near the surface. In 1610 Sir George Selby informed Parliament that the coal supply of Newcastle would be exhausted in 21 years. This fear of exhaustion stimulated invention for draining and ventilating mines. It is interesting to note that, whereas in 1700 it was estimated that the total production amounted to only 2,612,000 tons, and to 10,080,000 tons in 1800, the tonnage for the United Kingdom in 1913 amounted to 287,411,869, valued at \$708,758,708.

Preparation of Bituminous Coal—III

BY ERNST PROCHASKA
Benton, Illinois

SYNOPSIS—*Shall the entire output of raw coal received at the washery be washed? Shall the coal be sized before or after washing? To what limit shall the washing be carried? These are some of the questions confronting the washery designer or manager, and they are answered in this article.*

THE coal discharged from the raw-coal elevator at the highest point of the washery must be separated from its impurities and screened into the different sizes demanded by consumers. The ways and means employed in this process vary according to the system of washing followed. As all the bituminous coals are similar in nature, it becomes necessary to study the different points involved before we can follow clearly the development of the different methods used.

The first question is: Shall the raw coal as a whole be subjected to washing or will it be better to screen out the fines? This main question can be divided into several parts, because different conditions require different solutions. The first sub-question is: Is it possible to improve the fines by washing? This can be answered in the negative with all possible assurance. The consideration, however, as to how fine the coal can be to be successfully washed is still disputable.

RESULTS FROM ACTUAL OPERATION

Laboratory investigations and results of actual operation give largely different limits. It can safely be stated, however, that coal passing through a 20-mesh screen will not show any marked improvement by washing. However, it is not possible to give an absolutely binding limit for all sorts of coal. A correct decision in regard to the permissible fineness of the coal to be washed can only be arrived at through accurate and reliable tests.

If it has been proved that the fines can not be improved by washing, the next question is: Is it possible to screen out the fines in the dry state? The condition of the coal in the mine will primarily determine this question. If it comes from a so-called dry mine, dry screening is probably possible, but if the coal comes out of a wet mine, or contains more than from 5 to 6 per cent. of moisture, all efforts at dry screening will fail.

The third question is: Are the advantages gained from the screening out of the fines sufficient to justify the cost of installation and operation of the necessary machinery? The considerations governing this point are as follows: (a) If coal is to be sized before washing, the screening operation will without doubt be more perfect. (b) Dust mixed with water becomes slime, which hinders the jigging process. If the dust has been eliminated, the jigs will deliver a refuse more nearly free from good coal and therefore work with greater efficiency. (c) If the impurities in the raw coal contain fireclay, which dissolves freely in the water, and on the other hand the coal dust is comparatively clean, the fireclay and the dust will be mixed together in the jigs and the resulting fines will be high in ash. The

fines in this case will be of better quality if screened out before washing. (d) If the fines themselves contain fireclay, the wash water will become thick and difficult to clarify, requiring large and expensive clearing basins. (e) If the dust is sufficiently low in ash it can be mixed with the washed coal without increasing the ash in the final product. This method will also facilitate the difficult problem of dewatering the fines. (f) The possibility of reducing the ash in the washed product without increasing the loss of good coal, through screening out the dust, permits the addition of dust higher in ash than would be possible if the dust were not thus screened out.

In the light of the foregoing considerations, if heed is given to the fact that the removal of the fines is comparatively simple, the question of dust separation can be answered as follows: Except in cases where the raw coal contains too much moisture or where the nature of the material is such that little dust or sludge is produced, the installation of a dust separator ahead of the jigs is to be recommended.

The second question in regard to the proper method of washing is: Shall the coal be sized before or after washing? Close sizing before washing is not necessary. Only with a coal that is difficult to wash and one that is at the same time hard and not liable to make a great amount of fines, is sizing before washing to be preferred. Otherwise the sequence of operations will depend upon the nature of the coal—that is, how closely it should be sized or whether it should be washed unsized. Therefore, in washing plants we find at present the following main methods of procedure: (1) Sizing before washing, and the employment of separate jigs for each size. (2) Preparatory separation into two or three grades in addition to dust, and separate jigs for each of the three or four sizes. (3) Sizing into coarse and fine coal only, and separate jigs for both sizes. (4) Jigging of the unsized raw material with subsequent sizing into coarse and fine coal and rewashing of the fines. (5) Washing of the unsized raw coal without any sizing or rewashing.

With types 2 to 5, the final sizing of the coal for market is performed after washing. Type 5 is used for coking coals, and then only if the coal is easily washed.

SEPARATION OF DUST

Considering that not every washery is provided with a dust-collecting plant, and that the coal is sized either before or after washing, the required apparatus may be classified in the following order: Dust separating and collecting machinery, sizing machinery, washing machinery.

To separate the dust at once from the total raw coal would give only imperfect results. Therefore, it is desirable to screen the coal at first into two sizes besides the lump—a coarse product from $\frac{3}{8}$ in. to 3 in., and a fine coal from $\frac{3}{8}$ in. to dust.

A plant for the separation of dust should screen out in as perfect a manner as possible all the dust up to a previously determined size without carrying away particles of coarser coal; because, if part of the dust remains in the coarse coal, the intention of facilitating the jigging and avoiding cumbersome settling basins will not

have been fulfilled. On the other hand, if coarse coal goes with the dust some of the material which can be improved by jigging will not get the benefit of this improvement. Therefore, the fundamental principles are as follows: The utility of a plant for screening out the dust is in direct proportion to its perfect removal of dust containing no coarse coal.

Dust can be removed either on screens or by means of an air current. Screening appears theoretically preferable because the size of the perforations in the screen plates determines the largest size of particles that will pass through them. Failures encountered with the earlier installations were caused by the difficulty in keeping the perforations clear. This trouble, however, was overcome by the use of vibrating screens.

One great disadvantage of a screening plant for dust removal lies in the fact that such a plant is noisy, sub-

If the dust, however, is excessively high in ash it can be further treated in connection with the sludge, or it can be used as fuel under a boiler or in cement kilns, or it can be made into briquets. With fuel coal, the dust can be either briquetted or used under boilers; and if it is very high in impurities a considerable amount of it must be thrown away.

In the mining of coal foreign substances are mixed with the coal and carried with it through the washery. It is difficult to avoid this. Especially harmful are pieces of iron. They cause trouble and wrecks in the crushing plants, and work havoc with the conveyors and feeders. Furthermore, on account of their heavy weight they remain on the jig screens, where they form a heavy bed that prevents the required loosening up of the materials by weakening the water pulsation. This is detrimental to the effective operation of the jigs.

If a mine sends out a good deal of tramp iron, it is advisable to install a separate apparatus to catch all this foreign material. On account of the strong magnetic properties of iron a magnetic separator is the logical selection. Magnetic separators are simple and offer no difficulties. Any well-designed magnetic separator is adapted for this purpose, only it must be designed to handle great quantities. Magnetic separators are mainly of the revolving type and are either located in the bottom of a chute or in the head pulley of a belt conveyor. Revolving magnets have the advantage that they deliver the attracted iron automatically into a separate chute. Sometimes flat magnets are hung above the chutes, but in this case the attracted iron must be removed by hand.

THE JIG IS THE HEART OF A WASHERY

The more or less successful selection or construction of a jig determines the economic success of a washery. The commercial results of a washery are influenced by the efficient yield of the jigging process. The yield of a washery is the proportion of the washed coal to the raw coal, or of the output to the input. A washery which produces 1200 tons of washed coal from 1500 tons of raw coal has a yield of $1200 \div 1500 \times 100 = 80$ per cent. This yield depends upon the ash content of the washed coal.

It is impossible to make an absolutely perfect separation of coal from refuse. Some refuse will be carried over with the washed product and a certain percentage of good coal goes into the refuse. This imperfection of jigging brings about a decrease in the yield which is in direct proportion to the reduction of ash. The possible yield with a predetermined amount of ash is influenced by the composition of the raw coal and can only be determined in each special case by a thorough investigation. If the possible limits have been determined consideration must be given to the selling price of washed coals having different percentages of ash. The yield, percentage of ash and the selling price must be considered together in order to arrive at the maximum total value of the washed coal.

A typical example will illustrate this. Let us assume that the possibility of putting a coal on the market commences at 8 per cent. of ash. The assumed price of coal with this ash content is taken at \$3 per ton, and for each 1 per cent. decrease in ash the selling price advances 25c. per ton. Experiments gave the following results: An 8 per cent. ash gave 95 per cent. yield; a 6 per cent. a 90 per cent yield, and a 4 per cent. ash

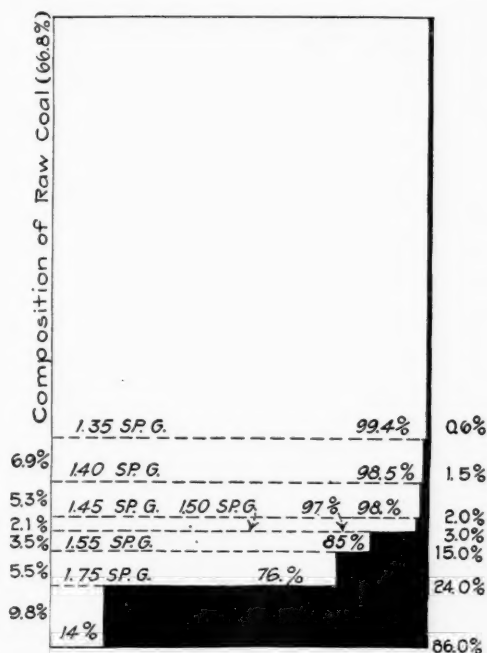


FIG. 1. CHART SHOWING COMPARATIVE EFFICIENCY OF DIFFERENT TYPES OF WASHERS

ject to frequent repairs, and that any air-tight inclosure for it is expensive and prevents the inspection of the moving parts. A dust separator using air currents works noiselessly and has no moving parts except the exhaust fan. It is also easy to inclose this type of apparatus in an air-tight casing, which is not objectionable because no moving parts requiring repairs are inclosed. With an air separator, however, it is not possible to get perfect separation in regard to sizes; some coarse material is always carried away with the dust or some dust remains in the coarse coal. In addition to a careful selection of the apparatus, its constant control and adjustment are required to insure satisfactory results.

WHAT SHALL BE DONE WITH THE DUST?

The use to which the dust should be put is determined by the nature of the coal, the amount of ash and the method of collecting the dust. With a coking coal, dust can be mixed with the washed fuel if the ash content will permit. This is the simplest method of dust disposal, because it helps in the dewatering of the washed coal. If the ash content is high, at least a portion can be mixed with the washed coal.

gave an 85 per cent. yield. The price for the different coals will therefore be as follows:

$$8 \text{ per cent. ash coal} = \frac{95 \times 3.00}{100} = \$2.85$$

$$6 \text{ per cent. ash coal} = \frac{90 \times 3.25}{100} = \$2.925$$

$$4 \text{ per cent. ash coal} = \frac{85 \times 3.50}{100} = \$2.80$$

This shows that the best returns would be received by washing the coal down to 6 per cent. ash.

The results secured from the tests for the yield and percentage of ash can be used to calculate the composition of the different products if the amount and percentage of ash in the raw coal are known. If 3000 tons of raw coal with 10 per cent. ash are to be washed, we get the following results:

	Composition of Washed Product			Composition of Refuse		
	Com-bustible, Tons	Ash, Tons	Total Tons	Com-bustible, Tons	Ash, Tons	Total Tons
With 8 per cent. ash, 95 per cent. yield	2,622	228	2,850	78	72	150
With 6 per cent. ash, 90 per cent. yield	2,538	162	2,700	162	138	300
With 4 per cent. ash, 85 per cent. yield	2,448	102	2,550	252	198	450

The figures given in the table, even if exact conditions are not known, permit us to draw a conclusion in regard to the composition and nature of the raw coal. The raw coal is comparatively clean, containing only 10 per cent. ash. The impurities are mostly bone coal. This can be judged by the large percentage of good coal in the refuse, which can only be caused by a slight difference in the specific gravity between the coal and refuse.

The foregoing example is carried out for unsized coal. If sized coal is to be studied, determinations for each size must be made separately. In actual practice many other factors must be considered which, however, cannot be expressed in such a simple way by means of figures. The most important of such considerations are: (1) The possibility of using the refuse as boiler fuel or of recovering some good coal from it, by crushing and rewashing. The refuse shown in the example given could be easily used at the mine for boiler fuel. (2) As the cost of washing becomes greater with crushing and rewashing, this cost must be deducted from the price derived from the sale of the recovered refuse. (3) The possibility of making through close washing an especially clean and valuable coal that will be in demand even under adverse circumstances, may change the conditions mentioned considerably. This advantage can not be expressed in figures and should be especially considered by those mines that on account of the poor quality of their raw coal can not compete in the market with producers better situated.

The economic operation of a washery can only be based upon a complete and intelligently conducted washing test. The first step in such an investigation is to make a chemical survey of the mine. This consists in making careful sections of the coal bed in different portions of the mine, taking samples of the coal and impurities in the proportion in which they exist in the vein (so-called channel samples). These samples are taken down to the size to which the coal will be crushed at the washery. The samples are then mixed in equal proportion by weight, all fine material which passes through a 20-mesh screen is screened out for separate treatment, and the main sample is separated or classified

by means of heavy solutions of varying specific gravity.

The objects sought by such procedure are, first, to obtain the theoretical ash or fixed ash in the pure coal, and second, to so classify the impurities as to plainly show the quantities, specific gravity and ash content of each class. For example, a coal which presents rather difficult washing problems shows the following results for the so-called sink-and-float test:

Pure coal lighter than	1.35 sp.g.,	69.7 per cent. with	7.11 per cent. ash
Impurities.....	1.35-1.40 sp.g.,	8.3 per cent. with	14.67 per cent. ash
Impurities.....	1.40-1.45 sp.g.,	3.6 per cent. with	19.10 per cent. ash
Impurities.....	1.45-1.50 sp.g.,	2.2 per cent. with	24.20 per cent. ash
Impurities.....	1.50-1.55 sp.g.,	1.0 per cent. with	28.02 per cent. ash
Impurities.....	1.55-1.75 sp.g.,	2.2 per cent. with	34.65 per cent. ash
Impurities.....	1.75 and over,	13.0 per cent. with	73.00 per cent. ash
Total raw coal.....		100.0 per cent. with	18.08 per cent. ash

From the foregoing it can be calculated that the ash in the washed coal would be 8.71 per cent. if the separation is made at 1.45 specific gravity and 9.10 per cent. if made at 1.55 specific gravity, assuming of course perfect washing. In the former case the washery loss would be 18.48 per cent. and in the latter 15.2 per cent., assuming that the refuse is free from coal.

A chemical survey of a mine, if properly conducted, will give accurate information on the following points: The amount and character of impurities in the run-of-mine coal; the amount of fixed ash or that in the pure coal; the amount of rejection which it will be necessary to make with a coal washer to produce any desired quality of washed product; the amount and character of impurities, if any, that could be drawn off as an intermediate product and used for boiler fuel, together with the heat value of such intermediate product; the composition of the washed product that may be expected; the size best adapted for the separation of the impurities; the units of machinery best adapted to produce the desired results with the least construction cost. In other words, such an investigation will show the financial returns that may be expected from a washery.

MECHANICAL CONSIDERATIONS

The mechanical arrangement of the jigs depends entirely upon the character of the coal. The specific gravities of the materials are to be primarily considered. The specific gravity of coal varies between 1.28 and 1.4, and that of the impurities usually lies between 1.5 and 3, or even higher in case of pyrites. If the specific gravity of the coal is close to or even overlaps in some instances the specific gravity of the impurities, we have a difficult problem on hand; but if there exists a considerable difference between the specific gravities of the two products the washing will become comparatively easy.

In the latter case simple pieces of apparatus are sufficient and one-compartment jigs can be used. In the first case, however, separate jigs with two or even three compartments must be employed and rewashing must be considered. Furthermore, it must be determined whether or not the impurities are disseminated throughout the coal. In this case the difference between the specific gravities of the materials is more or less obliterated and rewashing is advisable if the middle product cannot be used at the mine. If the difference between the specific gravities of the materials is small and at the same time the impurities are disseminated throughout the coal, jigging in three-compartment jigs would be advisable.

Many variations of the stated conditions exist, and it is difficult to predict which type of preparation should be used. The arrangement of the jigs should be such that the flow of the materials can be changed easily.

As to the actual performance of washers, it may be said in a general way that impurities lighter than 1.5 specific gravity are rarely separated by them to any considerable extent, and that a plant can be so designed as to eliminate practically all impurities heavier than 1.75 specific gravity and make a rejection of the larger portion of material between 1.5 and 1.75 specific gravity. There are few washers in operation, however, at the present time that are doing so well. Also, if the coal is not too fine there should not be more than 5 per cent. of coal in the refuse; and this amount will usually be less than 1 per cent. of the raw coal.

To show the efficiency of a washer, David Hancock, consulting engineer, has devised a chart upon which can be shown, graphically, the composition of the raw coal, washed coal and refuse. These are plotted to scale and show at a glance the comparative efficiency of different washers as determined from actual tests. A specimen of such a chart is shown. It represents the working of a Stewart type of washer. (See Fig. 1.)

DETERMINING COMPOSITION OF RAW COAL

It is necessary to know first the composition of the raw coal. This is determined by separations made for each five points of specific gravity upon an average sample. On the left side of the diagram to any convenient scale are laid off the percentages found. For instance, in this case the sample contained 66.8 per cent. of coal lighter than 1.35 specific gravity; therefore, at the distance represented by this figure the dotted horizontal line is drawn and marked 1.35 specific gravity. Also, the first class of impurity separated between 1.35 and 1.4 specific gravity was found to be 6.9 per cent. of the entire sample, and this distance is laid off to the same scale and marked on the chart.

After laying off the vertical scale in the same manner for the entire 100 per cent. of raw coal, the horizontal scale is then subdivided according to the per cent. of each class of impurity found in the washed coal as compared with the amount found in the raw coal. The balance, represented by the black area, is the rejection or refuse; both the quality and amount are indicated graphically, the areas being proportional to the weights of washed coal and refuse.

HOW TO USE THE "EFFICIENCY CHART"

The figures to the right of the diagram show the amount of each class of impurity which goes to waste and the amount which is retained in the washed coal. For instance, it shows that 0.6 per cent. of good coal is wasted. It shows, further, that practically no separation of coal and impurities is made below 1.5 specific gravity, and that of the impurities heavier than 1.75 specific gravity 14 per cent. is retained in the washed coal and 86 per cent. rejected. It should be noted in this connection that heavy impurities when retained in the washed coal are usually fine material that would pass through a $\frac{1}{4}$ -in. screen.

This chart can be called an "efficiency chart" of a coal washer and is applicable to any type of washer and any coal if the figures upon which it is based are accurately ascertained in any given case. In the case of the washer shown by the diagram, the ash of the

raw coal was 15.94 per cent. and this was reduced by washing to 11.90 per cent., the coal being a difficult one to wash. The amount of refuse was 10.8 per cent. of the raw coal, and the yield was therefore 89.2 per cent.

The percentage of reduction of the impurities from raw to washed coal has been, and still is, frequently cited as a guide in comparing different washer efficiencies. It is certainly a very unreliable guide unless the washers which are compared are working upon the same coal. It will be evident to anyone upon a little reflection that the percentage of ash or sulphur reduction will depend more upon the nature and amount of the impurities in the coal than upon the different types of washers. I have before me figures showing an ash reduction from 21.50 per cent. in the raw coal to 4.50 per cent. in the washed coal, the work being done by a washer little, if any, better than the machine which made a reduction from 15.94 per cent. to 11.90 per cent., giving a reduction of 79 per cent. as against 25 per cent. The explanation is to be found in the difference in the amount and character of the impurities in the coal from the two mines and not in any essential difference in the washers.

Another result might be cited where a washer identical with the one which produced a reduction of ash from 15.94 per cent. to 11.90 per cent. showed the following results: Ash in raw coal, 21.4 per cent.; ash in washed coal, 3.08 per cent., or a reduction of 85.6 per cent. It is of course absurd to suppose that any such difference could have existed between washers of identical construction, but the difference is simply due to the fact that the two coals contain impurities quite different in character and amount.

The following maxims are therefore fully established: Practically no separation of coal and impurities can be made in material finer than 20 mesh. It is usually the part of wisdom to avoid pulverization of the coal as much as possible; but in this respect, also, each particular coal is a distinct problem.

(To be continued)

Coal Mining in Mexico

The Piedras Negras district ranks first in Mexico in the production of bituminous coal; in fact, it is the source of supply for the whole republic for railroad and smelting purposes. In the last years of the revolution the coal mines were greatly handicapped on account of confiscation, labor troubles, and the closing of the many smelters throughout the country which consumed their outputs; but the year 1918 saw the opening of many of the mines that had been closed down and a boom in the operation of those that had been running at half capacity. The Mexican Government has restored practically all of the mines to their former owners and the present State Government is doing its utmost to favor mines in the handling of labor questions.

The output of the coal mines in the Piedras Negras district is estimated to have reached 73,500 tons of coal a month, and if conditions continue to improve it will be increased to 100,000 tons a month. The making of coke on a larger scale is contemplated. At present there are two mines, the Mexican Coal and Coke Co. and the Cia. Combustibles de Agujita, that are equipped with coking ovens and are making a limited supply of coke.

Coal-Stripping Operations in Ohio

BY S. B. CREAMER
Cambridge, Ohio

SYNOPSIS — *Stripping operations in Ohio are characteristic of the field. The topography of the surface and occurrence of the seams largely limit this method of recovering coal to the outcrops. Great activity in stripping coal has been manifested in the last few years, and where operations have not been systematically carried out money has been wasted.*

THE open-pit (or stripping) method for the recovery of minerals on a large scale dates back many years. This system of mining was introduced in the iron-ore region of Minnesota in 1892. The term "stripping" is understood to mean the removal of all the overlying formation and the uncovering of the mineral for loading. However, it has been less than a decade since stripping operations made their advent in the coal fields of eastern and central Ohio on a commercial scale. But due to the incentive created by the demand for coal, stripping operations have increased so rapidly in the past three years that it has been impossible to get reasonable delivery on stripping machinery.

The great demand for coal and the prospects of a large return on the investment caused many companies to be organized, and much experimenting was done. As a result large sums of money have been wasted on poor property, worthless machinery and impossible or prohibitive layout.

While the general features of steam-shovel mining may appear simple, nevertheless good management, close attention to details and systematic work are essential to success. In the iron mines of Minnesota the overburden is loaded into side-dump cars which sometimes are transported a distance of two miles by dinkey. In the coal-stripping fields of Ohio the overburden is not loaded into cars as in the iron mines, but is simply cast to one side after the coal has been removed. Thus the depth of overburden possible to strip depends on the size of the shovel, thickness of coal, character

of overburden and topography of the land. This feature is well brought out in Fig. 1, which illustrates a characteristic stripping operation in Ohio. The view is of the Coal Ridge Mining Co.'s No. 1 plant at Cambridge, Ohio. At the left is shown a large Marion shovel of the revolving type, which is removing the cover over the coal and depositing it on the right. The shovel in the foreground at the right loads the coal which has been stripped into cars, for transportation to the tippie. Conditions here lend themselves particularly to economical working and the operation is an ideal stripping. The maximum overburden is 40 ft. and the stripping follows the crop line on three sides of the property. The haulage track running through the stripping is a complete loop between the shovel and the tippie, making possible the moving of coal in either direction—an exceptional layout in the stripping field.

The first consideration of those contemplating a stripping operation should be a detailed study of the topographic and geologic structure as well as the thickness and steaming qualities of the coal. This study should consist of a topographic survey of the property. The property should also be thoroughly drilled to determine the thickness of the coal and the thickness and structure of the overburden. Core drills are most satisfactory for this work. Much stripping property in the No. 8 seam field has been hastily developed without the pre-

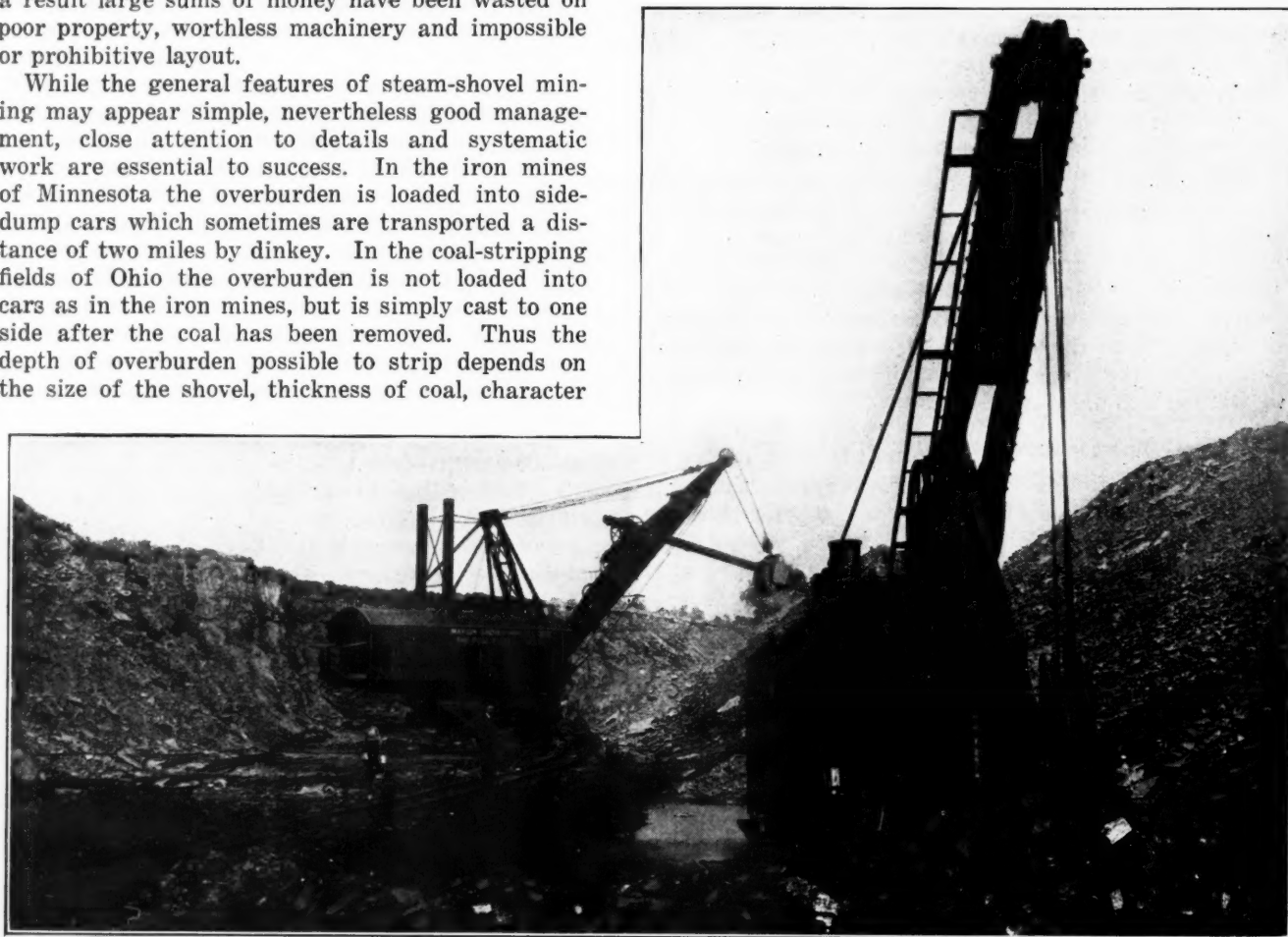


FIG. 1. STRIPPING PLANT OF THE COAL RIDGE MINING CO. AT CAMBRIDGE, OHIO

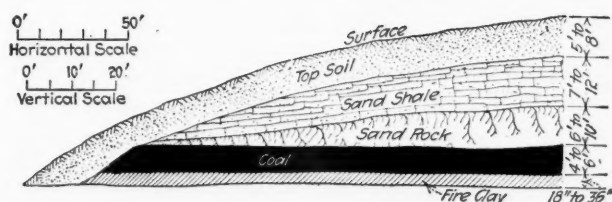


Fig. 2

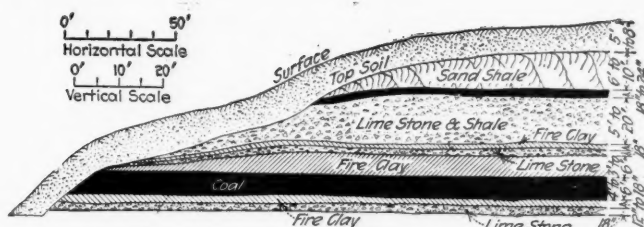


Fig. 3

FIGS. 2 AND 3. TYPICAL GEOLOGICAL SECTIONS OF THE OVERBURDEN OVERLYING OHIO COAL SEAMS
Fig. 2 shows the geological formation of the overburden of the No. 8 seam, while Fig. 3 shows that of the No. 7 seam

liminary surveys necessary for proper investigation and economic layout.

Ideal physical conditions are rarely found in the "stripping game" in Ohio. Such conditions would require a topography so that the property could be worked from two or more sides toward the center. The crop line of the coal should be such that the first cut of the stripping machine would be an open cut. This would necessitate a crop line with room for a spoil bank below the crop, the required width of which would be at least 150 ft. The geological formation of the overburden should include gravel or sand shale, which would make it possible for the shovel to dig without blasting. Under these conditions a bank of 40 ft. in depth could be moved without loss of coal with a 90-ft. boom for an indefinite number of cuts if properly operated.

In the No. 8 field the box (or through) cut is only used in a few instances, such as cutting through a saddle or low point in a hill. Without the box cut the crop line is an essential requirement, and this makes possible the open (or crop) cut for the first cut. Except in quite low flat ridges of small acreage the topography is such that the overburden increases rapidly in depth at each succeeding cut and geological structure more difficult to handle is encountered. Fig. 2 shows a typical geological section of the overburden overlying the No. 8 seam in Ohio. With one or two exceptions, this section prevails throughout the field. The coal is of little value until the 10-ft. cover line is reached, and the nature of the limestone is such that a cut 100 to 125 ft. wide can be dug without blasting.

In order to move overburden efficiently, and with a due regard for the proper care of the shovels, the overburden of succeeding cuts must be shot. The fireclay that lies directly over the coal is hard material, and it is almost impossible to dig it without shooting. However, it soon "air-slacks" on being exposed. Near the crop the limestone has a boulder-like formation caused by crevices due to ground water. In Ohio it seems to be impossible to do effective blasting without the aid of the jackhammer to drill the larger stones. The writer has measured stones 50 ft. long, 5 ft. thick and 10 ft. deep that have been moved a distance of 5 ft. horizontally from the face of the cut, without breaking, by a charge of 25 kegs of black powder placed 25 ft. from the face of the cut. However, as advance is made into the hill by succeeding cuts, the limestone takes the formation of a solid ledge and can be more economically blasted.

With the increase of overburden the cost of production increases, and to one not familiar with the "stripping game" it might seem financially impossible to mine coal at a profit in this manner. However, one must consider that from 90 to 95 per cent. of the coal is recovered by stripping in comparison to 65 to 75 per cent. by deep

mining. Under the efficient management of George D. Rowland, the Apex Coal Co., of Cleveland, Ohio, has profitably moved overburden 70 ft. deep, moving 14 cu.yd. of overburden per ton of coal.

In the No. 7 seam field the geological formation is of a different nature, as shown in Fig. 3. It is necessary to blast the overburden when cover of 25 ft. or more is stripped.

Oil from Cannel Coal

The committee appointed by the Institution of Petroleum Technologists in February, 1918, "to obtain evidence in respect of the quantity of cannel coal and allied minerals available in Great Britain as a source of motor spirit, fuel oil and other products, and to formulate a scheme for the utilization of such supplies," has issued its final report, states the London (England) *Chamber of Commerce Journal*, April, 1919. This report states that a company, known as the Midland Coal Products Co. (Ltd.), has been formed with a capital of \$500,000 (the whole of which has been subscribed), to produce oil from bituminous material, to manufacture domestic and industrial fuel, to deal with the chemical and other byproducts obtained, and to establish retorting plant on a commercial scale in which various retorts and systems of retorting can be tested. A site for an experimental and research station has been acquired in the center of the Midland coal field, flanked by the Great Northern, Great Central and Midland railways and adjacent to three shafts which are now bringing up a true cannel, an inferior cannel, half-inch top hards, and a soft coking coal. It is the intention of the company to test material from any part of the world. It is not only intended to erect large works (for which purpose an extensive site has already been secured), but also to assist in the establishment of works and to coöperate to that end with colliery owners and others in any part of the world. The company is receiving no government assistance, nor is it in any way interested in any particular type of retort or process.

There can be no doubt, the report states, that the more economical use of best raw coal, inferior coal, slack, colliery waste and other bituminous material not at present brought to bank, or, if brought to bank, put on the pit heaps, is becoming more and more a matter of immediate importance to the country, and more particularly to those engaged in the production or utilization of byproducts and the generation and distribution of power on a large scale. The technical advisors and others associated with the committee have done an immense amount of work in studying different types of retorts and producers already constructed, and designs and plans for suggested improved methods.

Know Your Battery Better*

BY J. H. TRACY
Philadelphia, Pennsylvania

SYNOPSIS—*Because the storage battery will stand abuse uncomplainingly some people appear to consider this a sufficient reason for abusing it. While it is well to observe many precautions in handling a battery, the two chief points to be cared for are: keep the battery cool and avoid gassing—that is, water decomposition through circulation of excessive charging current.*

IT IS an unfortunate fact that among battery users and even the electrical profession generally there is little really known about the performance and care of storage batteries. It is the purpose of this paper to explain in simple language the action of the lead storage battery and to recite the important points of the proper manner for caring for storage batteries in operation, and giving the reasons for such rules as are laid down by the manufacturers for the proper care of the battery, and in this connection to point out the penalties that must be paid if these instructions are not followed.

The reasons for these instructions are not generally appreciated, and, if understood, would be better remembered than mere rules. Some knowledge of the penalties following the breaking of these rules will also be of assistance.

A storage battery consists of one or more cells; each cell consists of positive and negative plates immersed in an electrolyte. The electrolyte of all lead storage batteries consists of a mixture of sulphuric acid and water in such proportion as to best meet the requirements of the service in which they are to be used. For the propulsion of locomotives, street trucks and the like, the electrolyte has a specific gravity, as shown by the hydrometer, of approximately 1.27 to 1.28.

The voltage of each cell is approximately 2 volts on open circuit, but is higher than this when the battery is being charged and lower while being discharged. The nominal voltage of a battery is therefore the number of cells multiplied by two.

HOW CURRENT IS PRODUCED

When a cell is being discharged the current is produced by the acid in the electrolyte combining with the active material of the plates. The active material of the positive plate is lead peroxide and that of the negative is metallic lead in a spongy form. When the acid combines with the active material, lead sulphate is formed in both the positive and negative plates. The sulphuric acid, which has been absorbed by the plates, has, of course, been withdrawn from the electrolyte, with the result that the specific gravity of the electrolyte is reduced, and for a full discharge this drop in gravity will be from 100 to 125 points; thus, if the gravity of the fully charged cell is 1.275, the gravity at the end of a full discharge will be between 1.175 and 1.150, depending on the type of cell and the amount of the discharge.

To recharge the battery, direct current must be

passed through the cells in a direction opposite to that of the current during discharge. This reversed current will reverse the action which took place in these cells during discharge. It will therefore withdraw the acid from the active material in the plates and restore it to the electrolyte. Thus, during the charge the electrolyte gradually becomes stronger as the acid is withdrawn from the plate until no more sulphate remains in the active material. All the acid having been returned to the electrolyte, it will be of the same strength as before the discharge, and the same acid will be ready to use over again during the next discharge, and the active material of the plate again in condition to combine with this acid.

During discharge the action has simply been that of the active material of the plates combining with the acid of the electrolyte. The whole object of the charge is to again withdraw this acid from the active material and return it to the electrolyte. When all the acid has been withdrawn, the cells are fully charged.

SOME FACTS ABOUT DISCHARGE OF BATTERIES

Operating instructions for storage batteries as issued by the manufacturers usually say little about discharging. As a matter of fact, a battery may, without injury to the plates, be discharged at any rate of current that it will deliver. There has been a widespread opinion that high rates of discharge are detrimental to the life of a battery. I can find no justification for this opinion with modern storage batteries. The maximum permissible rate of discharge is usually limited by the size of wiring used or by the capacity of the motor or other apparatus to which it is connected, and not by the battery itself. Caution should be given, however, against overdischarging the battery. It has already been pointed out that the drop in specific gravity of electrolyte should not exceed 100 to 125 points. Some have perhaps noticed the action of sulphuric acid on copper wiring terminals of a battery, and that a comparatively large amount of copper sulphate is formed when only a small quantity of the metal is eaten away by the acid. In the same manner, when the acid combines with the lead in the active material, the resulting lead sulphate occupies more space than the active material from which it is formed. The active material of all battery plates is porous, and this expansion is accommodated by a reduction in the size of its pores. All battery plates are designed to accommodate a certain amount of this expansion of the active material during sulphation; and in batteries of the type under consideration, this is limited to the amount represented by a drop in gravity of from 100 to 125 points, as already mentioned. Further discharge, even if it can be obtained at a satisfactory voltage, results in an excessive expansion, which so closes the pores in the active material that it becomes increasingly difficult to properly recharge the battery after an excessive discharge, and unless a proper recharge is given, the battery is liable to deteriorate. For this reason the discharge of any battery should not be carried beyond the point given by the manufacturers, as indicated by a hydrometer or by an ampere-hour meter.

*Paper presented before Illinois Mining Institute, May 23, 1919.

The function of the ampere-hour meter is to show the state of charge of the battery at all times and, therefore, indicate directly when the battery is approaching its limit of discharge as well as when it is approaching a state of full charge. To do this, it must be connected in the battery circuit at all times.

Operating instructions as issued by the manufacturers devote much more space to charging than to discharging. A battery must, of course, be charged with direct current, and the current must be connected to the battery so that it will go through it in the proper direction. The positive pole of the charging source must be connected to the positive terminal of the battery.

While a battery is being charged, the amount of sulphate in the plates decreases, the ability of the plate to give up the acid becomes reduced; in other words, during the early part of a charge the plates can give up the acid at a rapid rate, as there is a large amount of sulphate available. Therefore, a battery that is considerably discharged can be charged at a high rate, but as the charge approaches completion, currents at high rate cannot be utilized, and if high rates are maintained, only a portion of the current is used to withdraw acid from the plates, and the balance of the current acts to decompose the water in the electrolyte into oxygen and hydrogen, which are given off in the form of gas. Gassing of the battery, therefore, shows at any time whether or not the charging rate is too high. It therefore follows that when the cells are gassing on charge the rate of charge should be reduced. This reduction saves the loss of current, which is shown by the gassing, and also this gassing in excess has a wearing effect on the battery, which will be discussed further a little later.

The hydrogen and oxygen given off from the battery, when unmixed with a large amount of air, form a combination that will explode violently if ignited by an open flame or an electric spark. The compartment should therefore be open while the battery is being charged, in order that these gases may become mixed with air. Do not bring exposed flame, match, candle, cigar and so forth near the battery when charging or shortly after. If the battery is to be charged in a closed room or underground in the mine, especial attention should be paid to the ventilation of the charging room.

EFFECT ON PLATES OF ESCAPING GAS

It has already been pointed out that gassing represents a waste of charging current. It does more than this. The action of the bubbles of gas in escaping from the pores of the plates and in "boiling" to the top of the electrolyte have a tendency to wash the active material from the positive plate.

It is a well-known fact that batteries wear out. This wear shows itself to the eye principally in the positive plate, the active material of which softens with use, and were it not for this unavoidable fact, the life of batteries would be much longer than at present. As the active material of the plate softens with use, there is a tendency for the softened portion on the surface to fall to the bottom of the jar in the form of sediment. The action of the gas in escaping from the pores of the plate and the eddy currents stirred up in the electrolyte when the bubbles of gas rise to the surface hasten this shedding of material and, by just that much, shorten the life of the battery.

Excessive gassing should, therefore, be avoided if

the best life of the battery is to be obtained. A small amount of gassing at low rates and for a short time, at the completion of a charge, is not objectionable, but violent gassing should be avoided.

The cell temperature should not exceed 110 deg. F. The effect of high temperature is primarily to shorten the life of the wood separators which are always installed between the positive and negative plates.

There is always a tendency for wood in contact with sulphuric acid to become carbonized. This tendency is much accelerated at temperatures in excess of 110 deg. F.; and if a battery is regularly operated at temperatures in excess of this amount, it will probably be necessary to renew separators in the entire battery prior to the battery itself having ended its useful life.

There are also present in any commercial storage battery some impurities in the materials used, which cause a slight action in the cell, even when it is not in active operation. At high temperatures, these internal losses are increased, as is evidenced by the fact that a battery placed in storage will not lose its charge over a period of, say, six months if kept in a cool place. If kept at a temperature around even 100 deg. F., it will lose much more of its charge in, say, three months. In operation, however, the principal effect of high temperature on a battery is its deteriorating effect on the separators.

HIGH TEMPERATURES SOFTEN SEALING COMPOUNDS

If temperatures much in excess of 110 deg. F. exist, there will follow a softening of the sealing compound and a warping of covers of the cells, so that the sealing of the cells will lose its effectiveness and there will result a possible slopping of the electrolyte, which will lead to deterioration of the wood trays in which the cells are assembled.

With the foregoing limitations in mind, it is advisable to charge a battery at relatively low rates if local conditions permit. Of course, the lower the rate of charge the longer the time required to complete the charge. If 12 or 14 hours are available, the charging can be done at a low rate: approximately one ampere per plate per cell; that is, a 15-plate battery can receive all its charge at approximately 15 amp., if 12 or 14 hours are available for the charge. If this length of time is not available, the charging rate should be higher at the start of charge and then reduced to the rate mentioned before the battery begins to gas.

Where an ampere-hour meter is used, as is usually the case, the following general rule can be given: the charging rate in amperes must be less than the ampere-hours still out of the battery until the finishing rate is reached. In other words, the ampere-hour meter will always indicate a rate which should not be exceeded at that time. Of course, any rate less than that indicated by the ampere-hour meter will be satisfactory.

More complete charging instructions are given in the instruction books issued by the manufacturers, but these instructions all conform to the general principles which have just been laid down. The important points are: Avoid gassing and keep the cell temperature below 110 deg. F.

There has been considerable said about boosting storage batteries. Boosting consists of giving a battery a partial charge, usually at a high ampere rate and for a relatively short time. Boosting in no way differs from charging and, therefore, the same rules should be followed.

It is highly important to give the battery a weekly equalizing charge, which consists of a prolonged charge at a low rate, preferably about $\frac{1}{2}$ amp. per plate per cell until the specific gravity of the electrolyte will show no further rise over a period of one hour. As has already been pointed out, the object of charging is to withdraw all acid from the plates. In practice, the regular daily charges are not always given long enough to completely accomplish this. In fact this is not necessary provided the acid is completely withdrawn once a week by giving an equalizing charge. If this is not done and some sulphate is allowed to remain in the plates for a considerable time, it will gradually increase and the pores of the plate will become clogged and the battery lose capacity and deteriorate in such a way that it becomes increasingly difficult to restore the battery to its normal condition. To carry the daily charge to the full extent would involve an unnecessary amount of charging and gassing, which is not desirable. An equalizing charge properly given once a week accomplishes the desired result with a minimum of attention and a minimum of battery wear.

It is important that the plates of the battery be always covered with electrolyte. In order to accomplish this, it is necessary once a week, or possibly oftener, to add sufficient pure water to each cell to bring the electrolyte well above the tops of the plates. Use pure water for this purpose.

To determine whether natural water is sufficiently pure to use, a one-pint sample should be submitted to the battery manufacturer, who will make a chemical analysis of it, free of charge, and report to the user. If natural water is not sufficiently pure, it will be necessary to use distilled water, which can usually be purchased, or a small still may be installed by the user.

While the amount of impurities put into a cell at any one time may seem very small, these impurities accumulate with each filling, and will in time be present in such quantities as to affect the life of the cell.

The assembly of the cells is such that practically no water really evaporates, the bulk of the loss is due to disintegration of the water by the gassing at the end of the charge. No acid is lost in this manner, so none should be added to the cells unless some has been lost by spilling. Water should be added to the cells before charging in order that it may become thoroughly mixed with the electrolyte by such gassing as occurs. This is particularly necessary in freezing weather, as otherwise the water will remain unmixed and may freeze.

Keep the battery clean. Any piece of electrical apparatus should be kept clean and dry, in order that there may be no loss due to poor insulation. If the battery is not kept clean, the acid will slowly attack the wood trays in which the cells are assembled and not only weaken them, but may cause a failure of the insulation of the battery in such a way as to possibly cause burning of the jars, short circuits or a spark which may ignite gases around the battery and cause an explosion. Detailed instruction books give complete information as to how this can be most easily handled.

The battery should be inspected regularly and given such attention as may be required. Any piece of apparatus in daily use requires periodic inspections, followed by such cleaning and repairs as may be found necessary if the best results are to be obtained. Such inspections are less burdensome than the troubles which

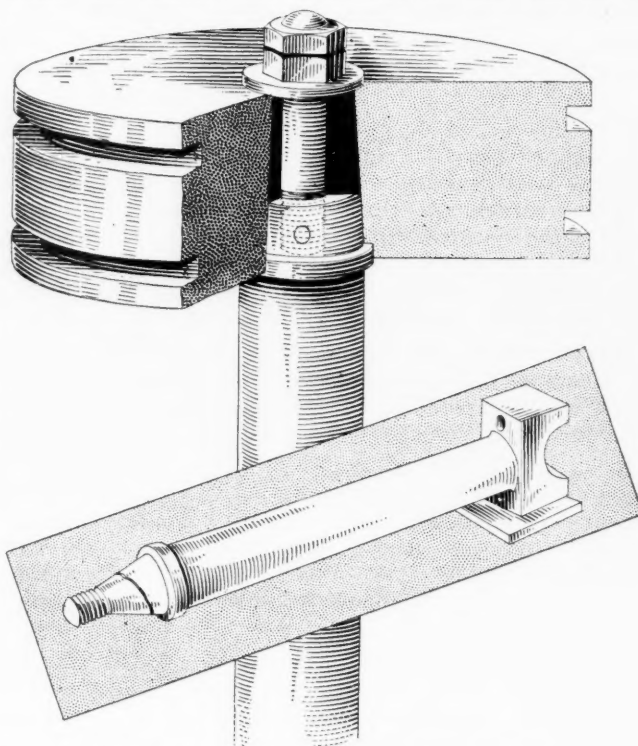
result with any piece of apparatus that is not properly cared for.

The action of the storage battery is relatively simple. The attention that it requires to keep it in regular daily service is simple and easily given. The mystery that exists in some people's minds regarding the battery is due to the fact that it does not complain under abuse. The operators do not appreciate, from their own observation, the results of abuse and so, in many cases, do not give the battery the attention that it deserves. It is hoped that this attempt to explain the reasons for giving the battery certain essential attention will result to the mutual advantage of both users and makers.

Emergency Piston-Rod Repair

How an emergency makeshift repair to an engine piston rod that had broken off at the tapered end, where it fitted into the piston, was made may be of interest to *Coal Age* readers. The design of the rod is shown in the illustration, which also shows the break as it occurred. The operating engineer had taken out the piston in order to examine and refit the piston rings. In putting the piston back and tightening up the nut, he broke the rod.

On looking the rod over it was found that a flaw and crack had existed, and when the rod nut was set up



DETAILS OF PISTON ROD AND REPAIR

tight the break resulted. The rod was of the type that had the crosshead forged on, and it became evident that to make or obtain a new one was a matter of weeks. Accordingly, a makeshift repair was necessary in order to operate the engine until a new part could be obtained.

The end of the broken rod was drilled and tapped out for a 1-in. stud; this was screwed in and pinned, the rod was placed in the piston, and babbitt metal was poured around the stud. The metal was peened down even at the top, a nut and large washer completing the repair. The rod worked satisfactorily by running the engine at half speed.

Heavy Paper Tamping Bags Prove of Service in the Blasting of Coal

Blasters as a rule realize the importance of tight tamping and of using proper tamping material. But proper tamping materials are not always available, so they sometimes use whatever may be near at hand with the result that more explosives are used than are necessary, increasing costs, or bringing down less coal or rock than could reasonably be expected from the quantity of explosives fired.

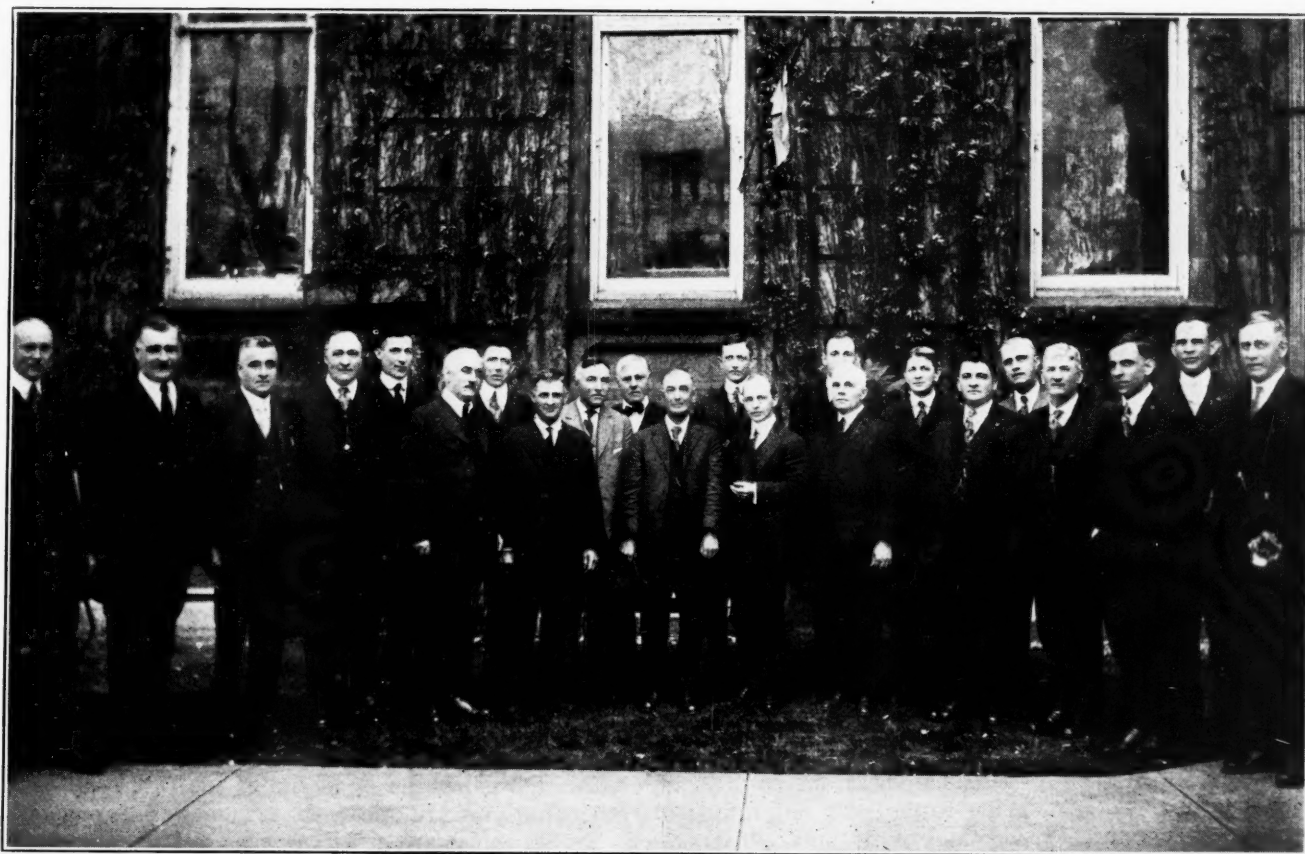
For instance, a miner will tamp with coal dust. This does not ordinarily pack well. Clay or loam would be much better, but a miner cannot be expected to go out of the mine for tamping whenever he loads a borehole. He therefore uses what he has at hand.

Miners and rock blasters are beginning to appreciate

Personnel of the Reorganized West Virginia Department of Mines

After the State of West Virginia, or at least the coal-producing sections of the state, had been redistricted in accordance with the terms of the Hale bill, it became necessary to appoint four new district mine inspectors. Following their appointment recently, both old and new members of the inspection staff lately were called to Charleston for a conference with the head of the department. The duties devolving upon each inspector were thoroughly explained by Chief Heatherman, who also pointed out the personal responsibility of each member of the force in enforcing the mining laws and seeing that conditions were safe.

During the day a photograph of the entire staff of the department was taken. This is reproduced here.



CHIEF OF THE WEST VIRGINIA DEPARTMENT OF MINES AND MEMBERS OF THE INSPECTION FORCE AT THEIR FIRST CONFERENCE SINCE REORGANIZATION OF DEPARTMENT

tamping bags made of heavy paper and used in many places as containers for sand, clay or loam to be used for tamping. The bags are particularly useful when loading holes pointed upward, the reason therefor being obvious.

A supply of these bags can be filled and taken into the mine or onto the job at the beginning of the day's work. The blaster is thus sure of having a tamping material that will give him maximum breakage at least cost. Their use also saves time when loading boreholes.

Tamping bags are useful when the blaster desires to make up charges of blasting powder in cartridge form as they usually do when loading uppers or holes in damp open work. They are much more convenient than clumsily made funnels or cones for which pieces of newspaper are generally employed.

Reading from left to right, those in the photograph are: Eli J. Mason, Seventh District; James Golden, Fourth District; Edward Nicholson, Twelfth District; W. B. Rigglesman, Fifth District; W. J. Heatherman, Chief of Department; Thomas Stockdale, Fifteenth District; R. M. Lambie, Thirteenth District; Zach Evans, Ninth District; E. L. Brewer, Eighth District; L. D. Vaughn, Eighteenth District; L. B. Holliday, Tenth District; M. B. Coulter, Sixth District; James W. Weir, Private Secretary to Governor; J. W. P. St. Clair, Seventeenth District; Evan L. Griffiths, Third District; J. L. Heizer, Chief Clerk; W. H. Sandridge, Second District; S. E. Hawkshaw, First District; V. E. Sullivan, Fourteenth District; H. L. Butler, Sixteenth District; R. L. Jenkins, Nineteenth District; J. G. Vaughan, Eleventh District.

Wiring at Mines

BY JACK L. BALL
Amsterdam, Ohio

SYNOPSIS—*If maximum results are expected from an electric mine system, maximum care must be expended thereon. In many mines either through ignorance or haste electric wiring is installed in an extremely careless and haphazard manner. In order to obtain best results as well as secure a large measure of safety, the wiring of a mine should be installed with as much care as it is in a residence, factory or office building.*

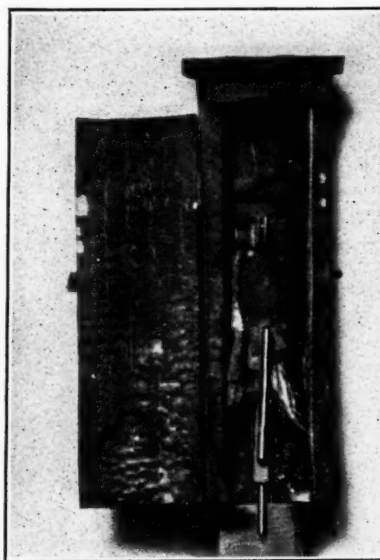
ELECTRIC wiring both inside and outside the mine should receive a maximum of care and have the best workmanship bestowed upon it that it is possible to obtain. It is noticeable, however, that this important detail receives little attention in many instances. Wiring in some coal-mine power houses, if carefully examined by insurance inspectors, would be condemned as entailing too great a fire risk. Such wiring is in some instances improperly insulated, the circuit breakers are mounted on wooden panels, light and motor circuits are connected between the breaker and the generator and not protected with fuses, switches are placed in inaccessible positions with inflammable surroundings, connections are loose, and poor workmanship is the rule rather than the exception. The local mine management is responsible for allowing such an installation to exist.

Inside of some mines the condition of the trolley and machine wires is such that it is a wonder that power can be transmitted at all, that someone is not electrocuted and that the mine is not continually on fire. Loose trolley wire connections or splices, wire loose from clamps and sagging, hangers improperly spaced usually too far apart on straight road and too few in number on curves, hangers loose from their supports and poor bonding, are a few of the common faults encountered. Machine wire may frequently be found in all sorts of inaccessible places, under falls, in abandoned workings or under water, with no protection from short-circuits except the circuit breaker on the switchboard in the power house. Single switches are placed on the positive side and installed in inflammable boxes. The worst feature from the standpoint of efficiency is loose connections or joints, grounds, and the fact that the copper is not infrequently too small to carry the load intended.

Where coal is mined and hauled electrically, the transmission lines as a general rule should have more attention, both in installation and upkeep, than they usually receive. Trolley wire should be run at as nearly a uniform height as possible. This, of course, is governed by the height of the entries, timbering and the like. However, trolley wire can be placed at a predetermined distance from the side of the rail and kept uniform in this respect. Patent trolley-wire splices that are in general use give excellent service, but in some instances because of the vibration induced by the trolley wheel, the wire becomes loosened, and arcing and heating begins with a resultant loss of power.

A practical illustration that shows that heat means a resistance is this: It will be noticed in cold weather that the shunt field of a generator requires considerable resistance cut in to keep the voltage normal. In the summer time when the weather gets warm the generator heats up to such an extent that it is necessary, at times, by means of the shunt field rheostat, to cut out all resistance to get the normal voltage; and even then this sometimes falls several volts below the potential desired.

A mine foreman in southern Ohio complained that two gathering motors and one haulage motor were not receiving enough power to handle the usual number of cars. A test was made at night, at which time several coal-cutting machines were using power. "Jumpers" were used from the trolley wire and rails to the machine circuit, which had been cut off from the regular source of supply. Two splices were found to be very hot and required renewing while three were quite warm.



RESULT OF PLACING A SWITCH IN A WOODEN BOX

After tightening the setscrews of the three splices and rebonding four rail joints, the trouble was overcome.

Trolley wires are either suspended from the rib, the roof or the top; the hangers are fastened in the coal, roof or wooden timbering with some form of expansion bolt or lag screw, or are clamped to "I" beams with some variety of clamp or bolt hanger. When using the expansion bolts care should be exercised as to the size of the hole drilled. If the diameter is too large, the bolt will soon work loose. If a clamp or a bolt type of hanger is used it is advisable to see to it that they are made tight when installed and that they are kept in this condition. If maximum efficiency is expected from a mine haulage system it should receive commensurate care.

Machine wires are sometimes much abused. In some cases it is found that they are strung around in all sorts of haphazard ways, with little attention paid to insulation or upkeep.

Copper forms an important item of mine expense. Circuits should be as short and direct as possible to get the desired results. If an efficient system is wanted,

with the fire hazard eliminated, the same care should be exercised in hanging machine wire that is used in an office or factory building. It is found sometimes that it would be better to use a smaller and a greater number of insulators. Wires should be well insulated, of course, not merely hung up on large-size insulators just to keep them off the bottom.

Care should be used when making joints. What is known as the "Western Union" joint, soldered, makes an excellent connection. As solder has a higher resistance than copper, it is advisable to first thoroughly scrape the wire, which insures a copper contact; after the joint is made it can then be soldered. Splices of the sleeve type are much in use and give excellent service. When using them, however, the proper size only should be employed and the wires butted together and the set-screws set up tight. Too large a splice with the extra space filled in with anything that is handy should never be used if a good joint is desired. Such work should be neatly done, with permanency in mind.

To save wire in many instances shortcuts are taken through some abandoned part of the mine. No careful workmanship is attempted. Falls occur, the wire is covered with slate and rock, or is immersed in water, and the machine runners are without sufficient power to operate their machines. Eventually, the wire is so completely covered up that it can never be recovered and is a dead loss.

Wire should be completely insulated from wooden timbering. It sometimes happens that a short-circuit occurs, heating the wires sufficiently to ignite the timbers. A small blaze in an aircourse soon reaches such proportions that it may result in a disastrous fire.

Usually, the machine circuits are not protected with circuit-breakers or fuses inside the mine. It is found, however, that single-pole switches, connected on the positive side, mounted on a slate base, the whole being placed in an unprotected, inflammable wooden box, are much in use. When machine and trolley wires are in the same entries, as many are, a two-pole switch should be used. Then, if for any reason a "short" occurs between the trolley wire and the negative side of the machine wire, the circuit can be completely broken and haulage can be resumed with a minimum loss of time. Also, if both the positive and negative sides are open, this insures a guarantee of safety when making repairs.

The accompanying illustration shows the result of a short on a machine circuit. The single-pole switch was mounted on a slate base, the whole being inclosed in a soft-pine box. No tubing was used for the outlets and the inside of the box was not protected with asbestos sheeting or other noninflammable material.

ALL MINERS AND SHIPPERS of coal are interested in the manner in which fuel is sampled by consumers. It should be done preferably when the coal is being unloaded, and in a regular and systematic manner, so that the entire quantity of the coal sample will be a fair representative of the shipment. Samples taken from the surface of coal in piles or bins, or in cars and barges, are generally unreliable. A shovel is often used for taking equal portions to make up a gross sample. For run-of-mine or lump coal, the gross sample should not be less than 1000 lb. If the coal contains an unusual amount of impurities in pieces of considerable size, the gross sample should be about 1500 lb., according to the Bureau of Mines. For slack coal and small sizes of anthracite in which the impurities are not in abnormal quantities, or are not in pieces larger than $\frac{3}{4}$ in., a gross sample of approximately 500 lb. is sufficient.

Legal Department

MULE AS AN "APPLIANCE"—A mule used in mining operations is an "appliance" within the provisions of the Indiana Employers' Liability Act, which requires employers to provide reasonably safe appliances, etc., for use of their employees. (Indiana Appellate Court, Van Hentenryck vs. Jackson Hill Coal and Coke Co., 120 Northeastern Reporter, 664.)

POWERS OF COAL-MINING COMPANY MANAGERS—The general manager of a corporation operating coal mines on leased property has no implied authority to sell or dispose of to another any part of the leasehold estate. (West Virginia Supreme Court of Appeals, Carroll-Cross Coal Co. vs. Abrams Creek Coal and Coke Co., 98 Southeastern Reporter, 148.)

INJURIES IN KENTUCKY MINES—A mine mule driver was not necessarily guilty of contributory negligence, barring recovery for injuries sustained in collision with a mule driven by another driver because he failed to stop on reaching an air curtain, raise it, and look beyond, where he had never been instructed by the mine boss to do so. Operators of different trips of cars are not fellow servants of each other within the rule of law applicable to Kentucky mines that an employer is not liable for injury to an employee when caused by negligence of a fellow servant. (Kentucky Court of Appeals, Tyree vs. R. C. Tway Mining Co., 208 Southwestern Reporter, 817.)

SHIPPER'S LIABILITY FOR FREIGHT CHARGES—The shipper of a carload of coal is primarily liable, as against the carrying railway company, for all proper freight charges involved. This liability of the shipper in interstate commerce cannot be specially released by a railway company as that would involve an unjust discrimination against other shippers. Under the Interstate Commerce Act, a railway company is not bound to notify the shipper of insolvency of a consignee and nonpayment of freight charges collectable from the latter, as a basis for holding the shipper liable. (Illinois Supreme Court, New York Central Railway Co. vs. Philadelphia & Reading Coal and Iron Co., 121 Northeastern Reporter, 581.)

WORKMEN'S COMPENSATION ACTS APPLIED—Where a coal company's employee was struck by an automobile in a street while mounting his wagon, after having returned from a saloon where he went to telephone to the company's office that certain unloading equipment had been left off his wagon, was injured in an accident "arising out of and in the course of his employment," within the meaning of the Indiana Workmen's Compensation Act, entitling him to an award under that act. (Indiana Appellate Court, Ceislik vs. Consumers' Co., 121 Northeastern Reporter, 832.) And a coal hauler who died of heat stroke while shoveling coal on a very hot day must be deemed to have been injured as such result of his employment as to entitle his dependent relatives to an allowance under the Connecticut Compensation Act. (Cunningham vs. Donovan, 105 Atlantic Reporter, 622.)

DUTY TO MAINTAIN SAFE APPLIANCES FOR MINE EMPLOYEES—Supporting plaintiff's right to recover damages for injuries sustained because of defects in a mine car on which he was riding, the West Virginia Supreme Court of Appeals decided in the recent case of Long vs. Pocahontas Consolidated Collieries Co., 98 Southeastern Reporter, 289, that an employer is bound to use reasonable care to provide his workers with reasonably safe machinery and implements with which to discharge their duties. Unless the defect occurs in the use of the particular instrumentality by the employee and is slight and easily remedied by the employee, the employer will be liable for injuries sustained because of the defect, unless it clearly appears that the defect was open and apparent and that the servant, by the reasonable use of his faculties, should have discovered the defect in time to have avoided the accident.

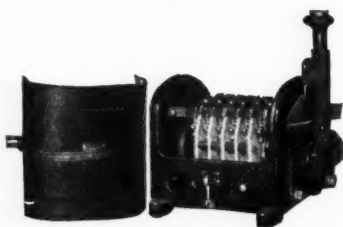
NEW APPARATUS AND EQUIPMENT

Master Controller for Use with Automatic Magnetically Operated Controllers

The accompanying illustration shows a new multi-speed full reverse master controller for use with automatic magnetically operated controllers. This master is smaller than previous designs and is especially applicable to machines where the operator's attention should not be diverted from the work or machine, and where space is limited. An internal gear drive, which is entirely inclosed but which is readily accessible by the removal of four screws, eliminates the liability of accident to operators through the catching of fingers or clothing in the bevel gears usually employed in straight line drive controllers.

This master controller may be mounted horizontally or vertically, the former permitting straight line movement of the handle and the latter a radial movement. A centering latch operated by a button in the handle indicates to the touch the "off" position of the master, while a strong notching spring is used to indicate the five positions in either direction. A maximum of 12 fingers may be mounted on the finger board, using six in each direction of rotation.

The new controller, although small and compact, is so designed that by the removal of two bolts the entire finger board may be taken from the frame, while the removal of three bolts allows the entire shaft and contact fingers to be withdrawn. Inspection, renewals and repairs are therefore easily effected. The construction of the finger board and drum follows the Cutler-Hammer standard, in that the fingers and segments are clamped to square insulated steel shafts, and adjacent



THE NEW CONTROLLER

contact points are separated from each other by arc barriers. This master controller is a new development of the engineering department of the Cutler-Hammer Manufacturing Co. of Milwaukee.

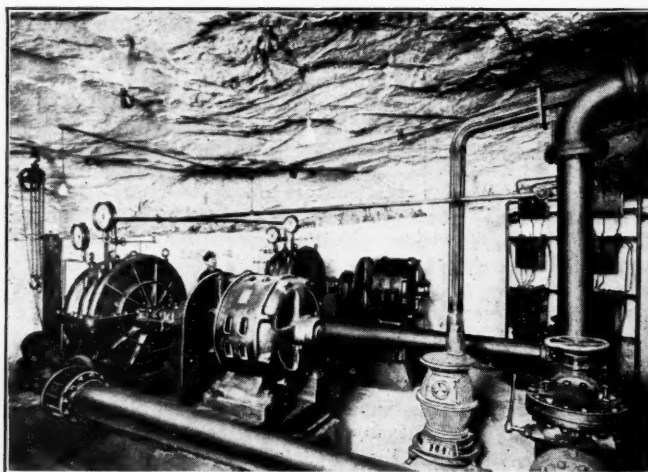
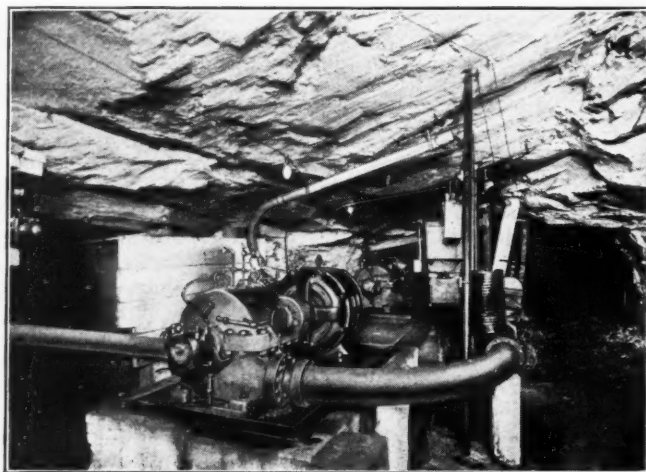
Economical Electrical Equipment for Mine Pump Service

The most essential requirements of mine-pump motors are that they run continuously and take as little power as possible. These needs are met by a complete line of Westinghouse motors and control built for all sizes and commercial circuits, either alternating or direct current. In addition to these the advantage of low first cost and maintenance expense, great compactness, flexibility and ease of control inherent with electric drive are obtained.

The simplicity and ruggedness of the type CS squirrel-cage motor especially adapts it to mine-pump service. It is built largely of steel and has nothing to wear except the bearings, which are large, well lubricated, and require but little attention. These motors may be started at the motor or at a distance. When started at the motor those smaller than 7½ hp. use a simple fused knife switch, while the larger ones require hand-operated auto-starters. When started from a distance an automatic starter is employed, of the resistor or auto-transformer type. This gives thorough protection and operates at high efficiency at both speeds. Only a simple double-throw switch is required to change from one speed to the other.

If the power source is limited, or a speed reduction is at times desired, the wound-rotor type CW motor with the same general mechanical characteristics as the type CS motor is furnished. With this motor also either hand-operated control at the motor or automatic control at a distance may be used.

Many mines have only direct current available, and for these type SK motors having the same simple,



TYPICAL UNDERGROUND ELECTRICALLY OPERATED PUMP STATIONS

strong and reliable construction, steel frame and rugged bearings are used. These motors are built self-starting as large as 20 hp., so that they may be thrown directly on the line from any desired point. For pumping from a sump, a float switch in connection with an automatic controller will start and stop the motor at the desired limits.

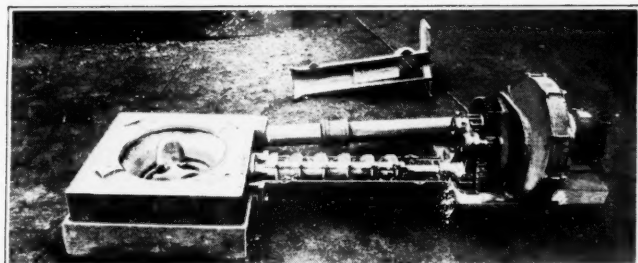
An especially handy outfit and an efficient arrangement of pumping equipment is obtained by mounting a motor-driven pump on a truck or mine car. This will enable quick transportation of the pump to any necessary location.

Westinghouse motors for mine pumps of either alternating or direct-current type are mechanically and electrically designed so as to give continuous, dependable and efficient service with little attention over long periods of constant operation. Where necessary additional protection may be added by inclosing the motors or supplying especially treated insulation to protect them from grit or dampness.

Small Electrically Driven Automatic Underfeed Stoker

The utility and scientific correctness of feeding bituminous coal to a fire from below is well recognized. The convenience and efficiency of the automatic stoker are also well known. Heretofore apparatus for mechanically stoking boiler or other furnaces has been built only in comparatively large units. These were far and away above the requirements of the small apartment house or large residence.

The American Smokeless Burner Co., of Seattle, Wash., has developed a type of automatic underfeed



SMALL AUTOMATIC UNDERFEED STOKER

stoker that may be constructed in small sizes. This device, which is electrically driven and automatic in operation, is made in five sizes giving a range in fuel feeding of from 2 to 800 lb. of coal per hour. It will thus be seen that the smaller sizes of this machine might be used for house or apartment heating.

The accompanying illustration shows one of these stokers set up in the open and the cover removed from some of the machinery. Coal is fed from a hopper or bin to the screw conveyor that forces it into the firepot at its extremity. Here blast is supplied by a fan and a revolving agitator in the center of the firepot forces the coal upward and breaks up any mass of coke that may tend to form. A single motor drives both fan and stoker proper.

With a device of this kind feeding coal from below and supplying draft under pressure at the proper height, also with the fuel sufficiently agitated to prevent the formation of a bed of coke, combustion cannot well

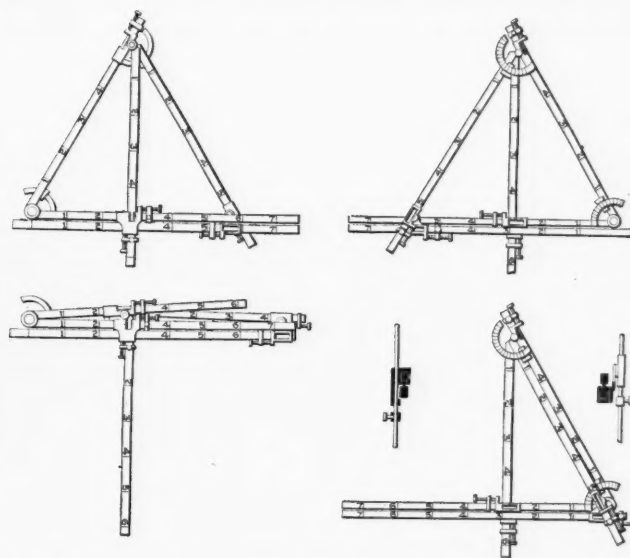
be other than perfect, or nearly so, and smokeless chimneys from furnaces where these stokers have been employed have been under observation for long periods and failed to show smoke except when the operation of the stoker has been interfered with. Furthermore, combustion is complete.

This stoker, of course, may be used for steam power generation but possibly lends itself quite as readily to hot water and steam heating plants where heretofore hand firing has been all but universal. In it several different kinds and sizes of coal have been successfully burned smokelessly. Any coal to be handled by it must be crushed to suitable size to pass readily through the conveyor. It is therefore particularly adapted to slack and nut—ordinarily not used for domestic purposes.

Trigonometer Solves Mathematical Problems Without Computations

The accompanying illustration shows a mathematical instrument known as a "trigonometer," designed to solve various mathematical problems without computations. It is particularly useful to the surveyor, or to others frequently confronted with the solution of triangles or the making of other trigonometric computations.

As may be seen, the instrument consists of four graduated bars joined together by one fixed and one movable



FOUR VIEWS OF THE TRIGONOMETER

protractor, one right angle slide and one varying angle slide. Thus the three sides, the three interior angles and the altitude of any triangle may be quickly found if sufficient data are available to solve the triangle mathematically. Suppose, for instance, the length of two sides and the included angle are known. The angle may be set on the fixed protractor while the length of the two sides may be scaled off on the bars joined by this protractor. The third bar then represents both in length and direction the third side of the triangle in question, while the fourth bar gives its altitude. In a similar manner the triangle may be solved if the magnitude of one side and two angles are known.

This instrument is the invention of Edward L. Renstrom, of Carbondale, Colo., and is covered by U. S. Patents, Nos. 1,149,085 and 1,268,620.

Coal-Mine Accidents by Nationality

The following table is published by the United States Bureau of Mines in its January Statement of Coal-Mine Fatalities in the United States. The remarks of the bureau regarding the table cannot be bettered and so are here reproduced:

Exports of coal in 1918 were 1,817,195, tons, valued at \$9,405,423, an average of \$5.17 per ton, as against exports in 1917 of 1,733,156 tons, valued at \$7,387,192, an average of \$4.26 per ton. Total imports of coal of all classes were 21,678,587 tons valued at \$71,650,584, as against imports in 1917 of 20,857,460 tons valued at \$70,562,357. There was an increase in the import of

COAL-MINE ACCIDENTS IN PENNSYLVANIA AND WEST VIRGINIA IN 1915 AND 1916, BY NATIONALITY OF VICTIMS (a)

Nationality	Pennsylvania (anthracite)							Pennsylvania (bituminous)							West Virginia									
	Men Employed (2 Years)	Per Cent. of Total	Killed			Injured			Men Employed (2 Years)	Per Cent. of Total	Number	Per Cent. of Total	Per 1,000 Em- ployed	Number	Per Cent. of Total	Per 1,000 Em- ployed	Men Employed (2 Years)	Per Cent. of Total	Number	Per Cent. of Total	Per 1,000 Em- ployed	Number	Per Cent. of Total	Per 1,000 Em- ployed
			Number	Per Cent. of Total	Per 1,000 Em- ployed	Number	Per Cent. of Total	Per 1,000 Em- ployed																
American: White...	116,730	34.98	245	21.25	2.10	783	31.26	6.71	102,532	29.28	193	21.98	1.88	818	26.21	7.98	78,966	48.93	313	36.65	3.96	1,234	43.99	15.63
Negro...	(b)								(b)								26,895	16.66	118	13.82	4.39	391	13.94	14.54
English...	7,468	2.24	30	2.60	4.02	46	1.84	6.16	7,949	2.27	16	2.16	2.39	60	1.92	7.55	926	0.57	14	1.64	0.07	25	0.89	0.07
Irish...	10,410	3.12	29	2.51	2.79	64	2.55	6.15	4,451	1.27	13	1.48	3.92	39	1.21	8.77	671	0.42	4	0.47	0.07	1	0.18	0.07
Scottish...	1,121	0.33	4	0.35	3.57	2	0.08	1.78	4,391	1.26	10	1.14	2.78	49	1.57	11.11	450	0.28	5	0.58	0.07	3	0.11	0.07
Welsh...	8,263	2.48	25	2.17	3.03	75	2.99	9.08	1,803	0.51	5	0.57	2.77	13	0.42	7.21	106	0.07	1	0.12	0.07	3	0.11	0.07
Total.....	143,992	43.15	333	28.88	2.31	970	38.72	6.74	121,126	34.59	240	27.33	1.98	979	31.37	8.08	108,014	66.93	455	53.28	4.21	1,660	59.18	15.37
Austrian...	19,342	5.80	69	5.98	3.57	114	4.55	5.88	21,775	6.22	86	9.80	3.95	278	8.91	12.77	3,642	2.26	40	4.68	10.98	122	4.35	33.50
Belgian...									1,770	0.51	2	0.23	1.13	23	0.74	12.96	114	0.07	1	0.12	0.07	2	0.07	0.07
Bohemian...									1,035	0.30	2	0.23	1.93	7	0.22	6.76	65	0.04	4	0.47	0.07	1	0.04	0.07
Bulgarian...									2,142	0.61	4	0.46	1.87	7	0.22	3.27	202	0.13	2	0.23	0.07	1	0.04	0.07
Croatian...	173	0.05							1,531	0.44	5	0.57	3.27	14	0.45	9.14	77	0.05	1	0.12	0.07	3	0.11	0.07
French...									7,592	2.17	15	1.71	1.98	60	1.92	7.90	976	0.60	3	0.35	0.07	33	1.18	0.07
German...	5,637	1.69	24	2.08	4.26	32	1.28	5.68	414	0.12	1	0.11	0.11	5	0.16	0.07								
Finnish...									862	0.25	2	0.23	0.92	14	0.45	12.88	345	0.21	4	0.47	0.07	1	0.04	0.07
Grinish...									1,087	0.31	1	0.11	0.92	14	0.45	12.88	1,074	0.67	14	1.64	13.04	25	0.89	23.28
Greek...	2,363	0.71	12	1.04	5.08	21	0.84	8.86	7,430	2.12	15	1.71	2.02	33	1.06	4.44	788	0.49	4	0.47	0.07	8	0.29	0.07
Hungarian...									21,094	6.02	63	7.18	2.99	146	4.68	6.92	9,620	5.96	41	4.80	4.26	135	4.81	14.03
Italian...	26,408	7.91	104	9.02	3.94	224	8.94	8.48	51,484	14.70	157	17.88	3.05	519	16.63	10.08	18,609	11.53	127	14.87	6.82	381	13.58	20.47
Lithuanian...	26,733	8.01	127	11.02	4.75	247	9.86	9.24	4,794	1.37	19	2.16	3.96	71	2.27	14.81	921	0.57	6	0.70	0.07	32	1.14	0.07
Livitch...									242	0.07				2	0.07	0.07	460	0.28	2	0.23	0.07	8	0.29	0.07
Montenegrin...	48	0.01							279	0.08				3	0.09	9.00	33	0.02	1	0.12	0.07	4	0.14	0.07
Polish...	55,274	16.56	286	24.81	5.17	500	19.96	9.05	34,611	9.88	88	10.02	2.54	328	10.51	9.48	5,080	3.15	54	6.33	10.63	120	4.28	23.62
Roumanian...									128	0.04	1	0.11	0.11	1	0.03	0.07	870	0.54	6	0.70	0.07	20	0.71	0.07
Russian...	22,285	6.68	102	8.85	4.58	170	6.79	7.63	14,694	4.20	41	4.67	2.79	114	3.65	7.76	4,025	2.49	51	5.97	12.67	138	4.92	34.29
Serbian...									131	0.04	3	0.34	0.34	7	0.22	0.07	317	0.20	2	0.23	0.07	7	0.25	0.07
Slavonian...	22,042	6.61	76	6.59	3.45	167	6.66	7.58	51,344	14.66	125	14.24	2.43	463	14.83	9.02	3,508	2.17	22	2.58	6.27	71	2.53	20.24
Spanish...									3,444	0.98	6	0.69	1.74	31	0.99	9.00	591	0.37	8	0.94	0.07	9	0.32	0.07
Swedish...	570	0.17				6	0.36		277	0.08	1	0.11	0.11				279	0.17	1	0.12	0.07	4	0.14	0.07
Syrian...	149	0.04				4	0.16		117	0.03							213	0.13	2	0.23	0.07	5	0.18	0.07
Turk...									117	0.03							211	0.13				2	0.07	0.07
Tyroler...	1,075	0.32	2	0.17	1.86	7	0.28	6.51	769	0.22				3	0.07	0.07								
Not segregated...	451	0.14	4	0.35		8	0.32		240	0.07	1	0.11		3	0.10		714	0.44	4	0.47		6	0.21	
Total.....	189,712	56.85	820	71.12	4.32	1,535	61.28	8.05	229,007	65.41	638	72.67	2.79	2,142	68.63	9.35	53,372	33.07	399	46.72	7.48	1,145	40.82	21.45
Grand total...	333,704	100.00	1,153	100.00	3.46	2,505	100.00	7.51	350,133	100.00	878	100.00	2.51	3,121	100.00	8.91	161,386	100.00	854	100.00	5.29	2,805	100.00	17.38

(a) Based upon official records for the years 1915 and 1916 as reported by the state departments of mines.

(b) Not segregated, as only a few are employed.

Coal Production in Canada in 1918

The preliminary report of John McLeish, chief of the Canadian Division of Mineral Resources and Statistics, of mineral production during 1918 gives the total production of marketable coal at 14,979,213 short tons, valued at \$55,752,671, or an average of \$3.72 per ton, being the largest on record with the exception of that of the year 1913. The production in 1917 was 14,046,759 tons, valued at \$43,199,831. The total output including waste and unmarketable slack in 1918 was 15,405,958 tons, as against 14,435,361 tons in 1917. The production of 1918 included 115,405 tons of anthracite, all from one mine in Alberta; 11,532,592 tons of bituminous and 2,784,283 tons of lignite coal.

The increase in production has been obtained chiefly in Alberta, though there were also substantial increases in British Columbia and New Brunswick. The Nova Scotia production fell off 474,289 tons, or 7.5 per cent. as compared with 1917—New Brunswick increased by 78,651 tons, or 41.6 per cent.; Saskatchewan fell off 10,135 tons, or 2.85 per cent.; Alberta increased 1,205,496 tons, or 25.45 per cent.; and reached its highest production on record. British Columbia increased by 134,703 tons, or 5.53 per cent. The figures of the production by provinces are as follows in short tons—Nova Scotia, 6,327,091; New Brunswick, 189,095; Saskatchewan, 355,445; Alberta, 4,736,368; British Columbia, 2,433,888; Yukon Territory, 4872.

bituminous coal, but a falling off in the import of anthracite. The estimated consumption of coal amounted to 34,840,605 tons as compared with a consumption of 33,123,735 tons in 1917.

The total output of oven coke during 1918 was 1,234,347 short tons made from 1,945,475 tons of coal, of which 1,348,232 tons were of domestic origin and 597,243 tons imported. In 1917 the total output was 1,231,865 tons of coke, made from 1,928,923 tons of coal. At the close of the year 1560 ovens were in operation, 1041 were idle, and 115 were building. Exports of coke were 29,612 tons, valued at \$223,629, as against exports in 1917 of 23,595 tons, valued at \$137,318. The imports of coke were 1,165,590 tons, valued at \$8,975,445, as against imports in 1917 of 970,106 tons valued at \$6,517,260. The estimated consumption of oven coke was 2,363,270 tons, as compared with 2,192,373 tons in 1917. Of the total output of coke 879,063 tons, or 71.2 per cent. was made in byproduct recovery ovens and the byproduct recovery included ammonium sulphate 10,525 tons and tar 7,697,435 gallons.

Lignite coal can be cheaply mined, and the mines are generally free from explosive and dangerous gases. As a rule sulphur is not found in objectionable quantities in this fuel. Once started, lignite burns well—one drawback being that it needs more attention than the average bituminous coal fire.

News From the Capitol

By Paul Wooton



Government's Purchasing Policy Leads to Controversy

Other chapters are being written in the controversy between the Director General of Railroads and the Secretary of Commerce as to the Government's purchasing policy. The discussion of this subject is being followed with the keenest interest by practically every industry. This is testified to by thousands of letters on this subject which are pouring into every Bureau in direct touch with industry and augmenting the mail of every senator and member of the House of Representatives. While the coal and metal mining industries and the makers of steel are affected more than are most other industries, it is clear from the communications reaching the capital that every community in the country is interested in the proper exercise of buying power. Secretary Redfield, in his most recent expression on the matter, says:

The various transportation elements include a controlling purchasing power over our industries and through them over our labor and our producers of raw material. It would lie in their power to injure or even destroy not one but many industries simply by either refusing to buy or by delaying buying at a critical period or by insisting upon impossible prices, or impracticable terms. Most business men will, I think, agree that it might make relatively little difference to industry who administered the laws or even what the nature of those laws might be if power over the life and death of industry lay in the hands of a few men because of their ability to purchase or to refuse to purchase its output.

This power, which is not so much by purpose as by its very nature autocratic, would be peculiarly difficult to reach and control by law because it is impracticable to regulate by statute when or how buying must be done. Procedure can indeed be fixed. Publicity can be provided and competition secured in form. The danger suggested, however, comes not from paying excessive prices but from the reverse, from forcing by the pressure of enormous buying power prices, terms and conditions of such a character as substantially to put our industrial fabric into the hands of masters of almost imperial power. Let there be given any one of you ability substantially to control one-third or more of the coal purchases of the United States through your predominant power in buying fuel and that industry becomes plastic in your hands. Let there be placed in the hands of another of you the power to purchase from one-third to one-half or possibly more of the products of the steel industries or of certain portions thereof and that industry becomes your servant, to do substantially as you will. The same is true of other great industries like copper, the shipyards and the builders of machinery. It will, I am sure, become clear to your thought after reflecting upon the incidental creation through Government operation of a unified buying power that there would be established an economic force so mighty as to work its will with industry and labor and to make them its creatures.

It is not assumed that there would be intent to do harm. The reverse is undoubtedly true. It may indeed be taken as certain that as in the past and present so in the future conscientious and careful men would do the work. Ruin, however, can well be wrought by want of thought, by absence of social vision, by incomplete knowledge, by partisanship—involving either a party or directed to a service or a person, by the sense of irresponsibility arising from possible brief tenure of office or by the loss of balance arising from the intoxication of power. Years are not required to cripple an industry. It can be done in months or even weeks. There seems to be involved, also, the principles of democracy in commerce as against autocracy, with all that both imply, and the deeper one's thought goes into the matter the more one questions whether there would not be created an empire within the state which, however free in form the state might be, would of necessity control it from inside.

Continuity of operation in industry is essential to effectiveness and low cost. From the human standpoint it is more important still. It is essential to continued employment and to regular earning power on the part of labor.

Director General Hines, in an "I-told-you-so" statement, analyzes the earnings of some of the steel makers and concludes that "grossly excessive profits" are being earned. As Mr. Hines' statement is certain to be the basis of a fiercer phase in this industrial controversy and provocative of efforts to enact remedial legislation, it is reproduced herewith in its entirety:

When the Industrial Board approved the prices proposed by the steel interests it became at once apparent to me and I so indicated in various discussions with representatives of the Government that that approval would encourage the steel interests to stand together on those prices even though governmental approval was withheld. I felt, however, that even so it would be far more in the public interest for the Government to withhold approval and if necessary pay such prices, for the time being, under protest rather than indorse the prices, and that too for the entire calendar year, as was proposed by the Industrial Board, and thereby given an official sanction to prices which were unreasonably high and which would merely serve as a starting point for still higher prices later on.

The result has been in exact accordance with this forecast. Six of the leading steel interests, in response to the Railroad Administration's request for bids for steel rail, have submitted bids which are uniform in all respects as to prices and conditions of manufacture and are in strict accordance with the prices proposed to and approved by the Industrial Board. In view of the immediate need for 200,000 tons of steel rails, orders have been placed at the price thus indicated (that is \$47 per ton for open-hearth rail) for that quantity with the Carnegie Steel Co., the Illinois Steel Co. and the Tennessee Coal and Iron Co., all of which are subsidiaries of the United States Steel Corporation, and with the Colorado Fuel and Iron Co., the Bethlehem Steel Co. and the Lackawanna Steel Co. This action is taken not only without approval of the prices but for the reasons shown below with emphatic disapproval of the prices and the manner of their establishment.

That action of these six steel companies in making uniform bids was taken under the leadership of the United States Steel Corporation is clear from the fact that immediately after the Railroad Administration announced finally that it would not approve the prices fixed by the Industrial Board, Judge Gary for the Steel Corporation took the initiative in announcing publicly that the Steel Corporation was strictly maintaining the prices approved by the Industrial Board and that it seemed to him that would be the attitude of other manufacturers. The subsequent action of the Steel Corporation and the other manufacturers in submitting their bids has accorded completely with Judge Gary's announcement.

The Steel Corporation's annual report to its stockholders shows that after paying all wages and other operating and maintenance expenses and allowing most liberally for renewals and paying interest on debt of subsidiary companies and also taxes other than war taxes and excess profits taxes it had net earnings on all rolled steel products of \$21.58 per ton in 1916, \$35.73 per ton in 1917 and \$33.53 in 1918. It is a remarkable fact that in the calendar years 1917 and 1918 the net earnings of the Steel Corporation aggregated approximately \$1,000,000,000, being in excess of the annual rental which Congress has sanctioned as reasonable for practically the entire railroad mileage in the United States. It is true the Steel Corporation had to pay out of these net earnings heavy excess profits taxes to the Government, but even after paying these taxes, making liberal allowance for depreciation, and extraordinary replacement funds, and after paying interest on bonds and 7 per cent. on preferred stock, there remained an earning of 39.2 per cent. on its common stock in 1917 and of 22 per cent. on its common stock in 1918. The fact that excess profits taxes were paid out of the net earnings in 1917 and 1918 does not in any way detract from the accuracy of those net earnings as a measure of the productiveness of the war prices which were charged by the Steel Corporation.

ESTIMATED COSTS SHOW WIDE VARIATION

These figures of actual net earnings per ton on the entire output of the Steel Corporation are much more convincing than estimated costs of rolling a particular steel product at a particular mill. The estimated costs may show the greatest variation, but the ultimate result is an enormous profit to the stockholders of the corporation. The claim that the wages of labor would be endangered by a reasonable price on steel is therefore not convincing.

Heavy profits are not confined to the Steel Corporation. It appears that the net earnings of the Lackawanna Steel Co. were \$12.40 per ton in 1916, \$24.81 in 1917 and \$19.88 in 1918; of the Republic Iron and Steel were \$13.88 per ton in 1916 and \$25.92 in 1917, and its profits for 1918 are not yet available; of the Colorado Fuel and Iron Co. were \$9.57 per ton in the year ending June 30, 1916, and \$13.91 per ton in the year ending June 30, 1917. The Bethlehem Steel Co. furnished no reports that give any information as to the profits per ton. In considering all these profits it must be remembered that the reductions from war prices which were proposed by the steel interests and are now being adhered to by them as the greatest reductions they are willing to make are practically completely offset by the great fall in the price of scrap iron alone (which can be and is used largely as a substitute for pig iron in the manufacture of steel) without regard to the various other reductions in cost which are coming about as a result of readjustment to peace conditions.

A seventh steel company, the Midvale Steel and Ordnance Co., in response to the request of the Railroad Administration for bids, proposed prices \$10 in excess of the prices proposed by the other six companies. It is interesting to note that the company which made this proposal showed on all its steel products net earnings in 1916 of \$24.62 per ton, in 1917 of \$44.23 per ton and in 1918 of \$35.93 per ton. Its apparent position now is that it cannot afford to make any reduction in the price of steel rail without reducing the wages of labor.

It is important to remember that the present policy of the steel interests in adhering to high prices on the ground that

the present high costs necessitate these prices is a policy that does not work both ways. It is a policy to keep prices from going higher as business increases and costs diminish. It will be remembered that the Industrial Board announced that the public could not expect prices to be lower during this calendar year, but it gave the public no hope that they would not go higher. The resumption of business in the country will probably result in the substantial diminution in the cost of steel production, but unless the attention of the public is constantly centered on the situation there is danger that the steel interests will take advantage of the increased demand to increase the prices of steel still further, even in the face of declining costs.

The situation in the steel industry is of greatest moment to the American public. The United States Steel Corporation is the largest producer and controls approximately 50 per cent. of the output. It takes the lead in maintaining a price, which, if its reports to stockholders are reliable, indicates a grossly excessive profit, and it does this for the avowed purpose of protecting alleged high cost producers which, however, so far as they make detailed reports on the subject to their stockholders, also indicate large profits. In other words the Steel Corporation appears to take the position that for the protection of other prosperous steel producers it is unwilling to initiate any competition in the steel industry and naturally these other producers are glad to follow this lead, and incidentally this position enables it to continue the enjoyment of very high profits. This condition operates to suspend the law of supply and demand when it could work in favor of the consumer, but it leaves that law free to operate with the greatest effect when it can work in favor of the manufacturer. This situation also works to deprive the public of the benefits of the increased efficiency due to the great combinations in the steel business. Those combinations are the result of public acquiescence and yet all the benefits of them go not to the public but to the private owners. The more powerful the combinations become the more successful they are in keeping up prices.

These reasons lead me to reiterate that the prices in question are unreasonably high at present and will become progressively more unreasonable as business improves and conditions become more nearly normal.

Soldiers Realizing Opportunities

One of the difficulties the Federal Board for Vocational Education has encountered in its work of reeducation is that of convincing disabled men of the generous aid offered by the Government: That all expenses of retraining are paid and in addition the needs of wife and children supplied; that this is not considered a loan, but the payment of a just debt, and that their only obligation is to make good and useful citizens of themselves, seems too good to be true. But when the disabled soldier realizes that he is the beneficiary—not of public charity, but of national gratitude, he accepts the proffered offer of retraining with good grace.

Already there have been 81,741 men to register with the board, the vocational advisors have made contacts with 52,367 of these and 2079 have started their training under the guidance of the Federal Board for Vocational Education.

Of the 4376 cases approved for training by the Federal Board for Vocational Education over 1200 have been approved for trade and industrial training, 846 for agricultural, more than 1200 for commercial and business courses, about 850 for professional courses. Three hundred and ninety-two are taking academic training and 99 are studying in some special course.

All the Fuel Administration's regulations and orders pertaining to petroleum and petroleum products were vacated effective May 15.

Interior Department Exposition Arouses Considerable Interest

Wide attention has been attracted by the exposition being conducted by the Interior Department. The extensive lobby of the new Interior Building is being used for the exposition. If the present rate of attendance continues, it is believed that no less than 100,000 persons will have visited the exhibit.

One of the most striking features of the Bureau of Mines' portion of the exhibit is the display of all stages in the handling of metals and other minerals from the crude raw material to the finished product. Copper, nickel, tin, lead, antimony, zinc, potash, sulphur, mica, abrasives and other minerals are thus shown.

Gas masks, oxygen breathing apparatus, dust and fume respirators, as well as a complete display of the absorbents used in protection against gases, are on display. The explosives exhibit is one of the most complete ever shown, as is the display of types of mine safety lamps. A section of the Bureau of Mines exhibit shows how coal analyses are made and how fuel inspection is conducted.

Certain Essentials Necessary to Effect Fuel and Operating Economy

At the recent meeting in Chicago of the International Railway Fuel Association, Eugene McAuliffe presented a paper on "Certain Essentials." While this was intended chiefly for railroad men, it nevertheless contained certain points of considerable interest to coal producers. Mr. McAuliffe spoke in part as follows:

"A year ago the Fuel Conservation Section of the American Railroad Administration was launched. The meeting held in Chicago in May, 1918, was really a revival with patriotism the dominating keynote. Many in attendance who were previously passive toward fuel economy pledged themselves to effort, and much has been accomplished in the year just passed.

"My caption, 'Certain Essentials,' signifies certain compelling features, which if attended to will accomplish more in one year toward effecting fuel and operating economies than has been accomplished in the past five years. Briefly, the outstanding essentials of the railway fuel problem, as I see them, are:

"*Clean Coal*—Buy clean coal, get clean coal. There is not a coal contract in existence that does not suppose the delivery of the cleanest fuel that the particular mine from which the purchase is made is capable of producing. Do not ask from the coal producer the impossible, but insist on the possible. Tests have proved that with coal containing 12.5 per cent. of ash taken as 100 per cent. the relative efficiency falls as the ash increases until coal with 40 per cent. of ash marks a total lack of efficiency.

"At the mine face, or on the tipple, is the place to clean coal. The removable non-combustible matter can be separated cheaper there than in the locomotive fire-box. Cleaning coal of excessive rock, slate, shale and sulphur is a 'delousing' process. Let the producer do the cleaning; such is a proper item in the cost of production. I have found on a majority of roads an insufficient and frequently untrained inspection force. I find that the roads which most need an inspection force are most lacking one. Good inspection supposes many things, including contract, quality, weights, clean equip-

ment and the proper class of equipment. Ninety-nine per cent. of the coal operators, all that are worth considering, will appreciate the help that an intelligent inspection force can give them."

Distorted valve motions, air leaks in locomotive front ends, distorted draft apparatus, clogged flues, grates and ash pans, the superheater, back pressure losses, and the old type of locomotive were then discussed, the speaker closing his remarks as follows:

"In conclusion, I wish to suggest the absolute importance of bringing every locomotive now in service, or that will be required for service, up to the maximum standard of efficiency. I have been told that the work of applying superheaters and brick arches under order, and in some cases, in stock, has been held up on certain roads because of insufficient funds. This is unfortunate, and I trust such a condition will be quickly remedied."

Expect That Poor Transportation Facilities Will Hamper Coal Output

Without in any wise being critical of the Railroad Administration, National Coal Association officials state that they fear that railroad transportation deficiency will interfere seriously with supplying the increasing volume of coal which must be produced during the latter half of the year. It is well known that only such repairs have been made to coal-carrying equipment as will keep it in running order. Thousands of cars have stood for six months without attention. In many instances motive power conditions are little better than are those of cars. Already car shortages are popping up here and there despite the large number of stored cars. It is believed that a considerable percentage of the stored cars can not be moved until repairs have been made.

Rumor of Government Control of Coal Believed to Be Unfounded

Reports in the daily press that the President expects to urge some form of Government control for the coal industry are believed in Washington to be unfounded. It is probable that they have their foundation in the fact that Secretary Lane has been asked to look around for the personnel of the commissions provided in the Garfield plan, which was the subject of a referendum taken by the National Coal Association.

Dr. Garfield says that President Wilson, after careful consideration of the plan, instructed Secretary Baker, while the latter was in Paris, to advise Secretary Lane to proceed with the formation of the commissions which are a necessary part of the plan. President Wilson said that these commissions, immediately after organizing, should begin the necessary studies relating to coal and all other raw material industries.

The Railroad Administration has issued a circular dealing with the storage of coal. Suggestions are made covering the proper method of storing to keep the cost of storage at the minimum and to reduce the hazard of spontaneous combustion. As it is estimated that the cost of transporting coal during the summer season is 60 per cent. of the cost of such movement during the period of extreme winter weather, employees are instructed to take those facts into account.

EDITORIALS

Government Tax on Western Readers

ON AND after July 1, 1919, subscribers of *Coal Age* residing in the western portion of the country must pay a substantial national tax for the sole privilege of living west of the Mississippi River.

On July 1, 1918, a benighted United States Congress enacted what amounted to a 17 million dollar bonus on ignorance. It decided that there should be no distinction so far as the mails were concerned between information and plug tobacco or other merchandise. It accordingly sectionalized the country and established a zone system in second-class postage, under which all newspapers and periodicals are carried. Nine-tenths of the literature perused by those who read or study technical subjects, so as to improve themselves and their industries, is carried under this classification.

The War Congress carefully divided the sheep from the goats—the distinction depending entirely upon geographical location. It separated the reading public of America into eight different classes. It decided that the people living in the eastern zones, where the nation's publishing is chiefly done, might secure their favorite periodical at comparatively small expense while those more remote should be progressively penalized until the point is reached where it becomes prohibitive to read anything except the local paper containing the latest town gossip. One concession (resembling the procedure of the boy, who, wanting to remove his puppy dog's tail without causing severe pain to the animal, amputated the member in small increments) was granted by these law-makers. They agreed to apply the thumbscrews gradually, the maximum pressure being attained in 1921.

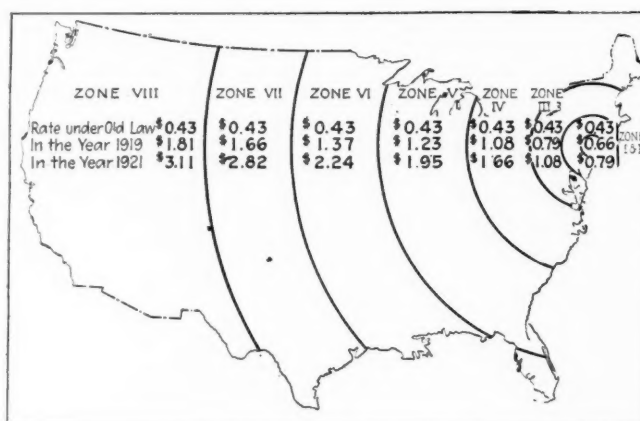
Under the old law, or that in effect in 1917, it cost a flat 1c. per pound to mail *Coal Age* anywhere in the United States, or 43c. for the 52 issues of the year. Reference to the accompanying map will show present conditions and those that will exist two years hence. Even now the yearly postage alone on *Coal Age* mailed to the territory including and west of the Rocky Mountains is considerably over half the subscription price of the paper. The exorbitant postal charges established by this system actually erect a formidable barrier around each zone, effectively prohibiting the interchange of intelligence or information with the world outside.

This tax on intellect, this bonus on ignorance, since it was embodied in the War Revenue Bill we at first regarded as being purely a war measure. In company with other publishers and readers of publications we

could not force ourselves to believe that it would be seriously considered after the stress of war had passed. And rather than impose upon our readers what we considered was a purely temporary burden, we shouldered it all ourselves, hopefully awaiting the repeal of this pernicious enactment.

We now learn that it is proposed to perpetuate this blunder, this monumental example of out-and-out class legislation.

It will be immediately apparent that although we have thus far carried the entire burden of increased postage no publisher can long continue to bear such an increased tax unaided. Therefore, beginning with July 1, those of our readers who reside west of the Mississippi River must add 50c. to their yearly subscriptions to defray in part the extra mailing charges. As will be seen, we are even then breaking



much better than 50-50 with our western readers.

It is with deep surprise, mingled with no small amount of shame, that we learn that in this age of public schools and compulsory education men can be found (not to say be elected to posts of high responsibility and honor) who are willing to sectionalize the country, discriminate against the man who through force of circumstances must secure his "learning" through home study and hard knocks, and compel the ambitious miner or mine official to pay through the medium of zone postage on his favorite technical journal for such things as the free distribution of seeds to the farmer or backyard gardener by artful, politic, self-promoting politicians.

If you believe that the present zone system of postage is just, equitable, right and tending to promote the best interests of the coal industry, your community, your state and the country in general, you will "lie low and keep quiet." If, on the other hand, you believe it is none of these things, you will do exactly the opposite and demand from your duly constituted representatives in both houses of congress its prompt repeal.

A principal business for every man—coal man or other—is the nation's business. Industry needs to be speeded in slack periods, or the coal operator will not be prosperous nor the miner prosperous or contented.

The Reclamation Service is still running a mine at Williston, N. D. From state reports, we gather it is now leaving 42 in. of coal in the roof instead of 24 in. Yet we can still remember the time when government ownership was declared to be a complete solution for fuel waste.

Twenty-One Tons per Man-Shift

IN 1918 the average production per inside man in the anthracite region was 974 tons and in the bituminous region 1296 tons. The war made the figures large, and it is interesting to compare them with those showing the output in metal mines during the war period.

In this connection it may be noted that an extremely interesting figure was recently published by the Inspiration Consolidated Copper Mining Co. to the effect that the average production per mine worker at its shaft, which is located at Miami, Ariz., was 21 tons per man-shift. That, per year of 300 days, would mean 6300 tons per man. The ore is easy to mine, gravity delivers the material to the gangway chutes, and pulverization of the product is in its favor; but the figure shows how much more is being handled per man in some metal mines, even though in them payment by the day is the practice.

Anthracite must not be blown to pieces, and it doubtless takes more explosive to displace. The ventilation of the mines has to be speedy and positive. In the Inspiration mines, however, with its sulphide ores which are all the time oxidizing, the heat generated is considerable, and good ventilation is quite necessary.

What are the differences making for higher costs in the anthracite region? There are two main reasons: The methods of mining are different and the men in the metal mine do not mine by the ton. The Inspiration company, which pays by the day, uses methods made reasonable by reason of the use of day labor, so possibly there is only one real reason for the difference in cost, and that a difference in the method of payment.

An inquiry into the metal-mining costs and methods of Arizona would be well worth while. Some time ago an anthracite engineer made a trip of investigation. The report he made has never been given publication. All that has appeared has been something quite learned about the geology of the porphyries. The larger matter of interest was not treated, though it would be the main consideration to the coal-mining public.

Lest the point of this editorial be lost, we quote the actual words of Cornelius F. Kelley, president of the Inspiration Consolidated Copper Co., page 3 of the report of the year ending Dec. 31, 1918: "The average output of ore per man-shift for all the labor chargeable to the mining department was 21.5 tons." The comparison, we have just indicated, is at least interesting even if it be held to be not quite fair to the anthracite region.

Defeatism in National Business

THERE is a school of thought that is disposed to transfer Newton's law of motion, that "action and reaction are equal and opposite," into the domain of economic law. As the pedants of that school interpret its teachings: High wages are followed by low wages and high prices by low prices. The truth is that there is no evidence of any such law unless it is proved by the multitude of its exceptions.

Wages and prices have almost continuously risen for centuries. If action and reaction had been equal and opposite, there would have been no rise but a fluctuation between two limits. Instead, prices and wages have been lifted repeatedly and immensely, and have rarely been lowered in anything like equal proportion. It is

true that some commodities, subject to the quickening hand of invention, and others, the value of which is determined largely by transportation costs, had risen but little in price, or even fallen, just prior to the war; but the law of action and reaction had nothing to do with this condition.

There is no sign of action and reaction in the quantity of currency, in the population or its consumption, in the amount of wealth or bank deposits. All these items have increased almost steadily from generation to generation. Nor is there any sign of rhythmic fluctuation back and forth about a given average in the currency per capita, the consumption per capita, the wealth per capita or the bank deposits per capita.

A doctrine like that propounded is a most distressing form of antisocial propaganda. It fosters a feverish fear of decreasing prices just when business needs a restoration of its faith. It is defeatism in business. It says in effect that it is useless to resist the inevitable reaction, that the times are earmarked for a depression. That lowering in wages and prices, that business collapses must come about by reason of laws beyond our human powers. Such fatalism is a danger to our body politic and a heresy that needs stamping out.

Overproduction may be followed by underproduction. But who will say that we have built too many houses, constructed too many railroads, equipped them with too many locomotives and cars, rerailed and retied the railroads with too great vigor, bought ourselves too many suits of clothes, dredged too many harbors or built too many roads. Why! we have been avoiding all these things for months, almost years, during the duration of the war. Never was there a time when we so curbed our desires.

There is no reason in a despicable defeatism of this kind that keeps us from a prosperous activity. It is not merely a psychological condition that we face but a false reasoning. If we will but shake ourselves, we can have done with the lethal dream.

They Have Gained Ground; but From Whom?

BEFORE the war, coal companies lost money or made negligible profits. Wages to mine workers were much lower than today. All increases of wage, therefore, must have come out of the consumer, who is either a manufacturer producing for sale to workingmen or is a workingman himself. It is idle to contend that combinations to increase wages are not combinations against the consumer and of one laboring man against another. This does not necessarily condemn such combinations, but it is a pretense for anyone to declare that they are in the interest of labor as a whole.

Such a combination is for the advantage of the group which organizes the combination, and justifiable only if used to defend a right and not as a means of attaining an advantage over other groups. The six-hour day, for instance, as a permanent institution should not be granted to one group while denied to another, or one group will serve the public six hours while the public is serving the first group eight hours.

It is true that there are employments where long hours are justified. There should not be too great a restriction as to the number of hours spent by a man asleep in a cabin, stretched out in a caboose, watching a lantern or nursing a danger flag. Like should be compared with like. The mine worker is justified in the

eight-hour day, and he should not seek to shorten it till it is reduced in other similar industries. He knows by this time who is his real paymaster—the public—and knowing it, he will not hide the fact from his eyes that he must not seek too high a wage or work too short a day. If justice is to be appeased, all men must throw an equal weight into the scale of production.

Unions are for defense just as are armies. They should not be used for offense. They are to establish justice, not to impose a yoke. They are to set an example, not to violate principles. Owing to labor-union action, there is a large section of the workingmen of the country who have been dispossessed of their former wages. They have not had wage increases proportionate to increased living costs; for this they blame the unions. The unions reply, "It is your own fault; you should have had a union yourself." The reply resembles one Germany might be supposed to have made to Belgium: "It is your own fault, Belgium, you should have had a strong enough army to repel our invasion."

These are unpleasant truths, and it is only fair to state that there is an immense amount of admirable idealism in the union. The average union man believes he is a pathfinder, leading not only the union but the non-union men also to a bettered condition of life. As a matter of fact, it is questionable whether by depressing output and by causing strikes he has not decreased production and so lowered the amount of distributable wealth. Many an admirably intentioned person has done harm rather than good. It is permissible to wonder whether the union man is not one of these, and whether his claims for having caused a beneficial reconstruction of the affairs of mankind are justified.

He sees his own lot bettered and says that it is a happy world and that he is setting a good example, when really some other body of workmen, less unionized, less large, or whose work is less vital, is ground to the wall by the collective action of the better unionized, more numerous and more vitally important operatives to whose collective action the public is obliged to bow. These organized men may not be supermen, but they nevertheless lay down the law to a sometimes too complaisant world.

Why leave the business of the country to politicians? The policies of the country should be directed by the productive elements of the Nation—by labor and capital—and not by those who arrange to fatten off both.

Bolshevism and Some Other "Isms"

EVER since the Russian débâcle the world has heard much of certain false principles then termed, for the first time, bolshevism. To the majority of us it is difficult to distinguish between socialism, communism, bolshevism and plain anarchism. All of these "isms" appear to shade into each other about as do the prismatic colors of the rainbow. Each nevertheless has certain points or phases wherein it resembles one or more of the others and each, it would seem, arises from a common selfishness.

We in America have long prided ourselves that John Jones had exactly the same rights and privileges and was held in exactly the same curb by the law of the land as was Sam Smith or Rob Robinson—in the body politic John Doe was just as good as and no better

than Richard Roe. The social and economic system under which we dwell is similar and comparable to our principles of government. One man's money is exactly as good as another's; rewards for industry are measured solely by accomplishment, and each individual has as nearly an equal chance to better his condition as it is possible for human effort and organization to guarantee. The fair chance and the square deal for all are the two great objects sought. No power of man ever has made, or ever will make, any two individuals of the human or any other species exactly equal in strength, intelligence or ability. Nature does not deal in duplicates. The fact that one individual is stronger or keener than another is the result of nature or circumstances or both and is not chargeable to either the social system or the method of government.

Few will deny that our present form of government and economic state are the best that man has yet developed. They are probably the result of at least 10,000 years of experience in industry and the art of living. Despite all of this, however, the followers of, adherents to, or believers in, any or all of the above-mentioned isms inform us that the existing order of things is fundamentally wrong. They assure us that each individual should be rewarded for his effort, not according to the magnitude and efficiency of that effort, but according to the needs of the individual, regardless of the service, if any, rendered mankind.

To the disinterested onlooker this hue and cry appears much like the "kicking" of a "poor sport," like the groundless protest of a contestant in some athletic event who loses because he is too lazy to exert himself as energetically as his opponent.

Acquisitiveness is a universal trait. It is at once the common source of all wealth as we know it under our present social system and the mainspring that impels the "ismites" in espousing their pet theories. The adherents of socialism, communism, bolshevism, anarchism, or what not, want what they haven't got. They "want it bad" but not bad enough to work for it honestly as the man who now possesses it had to work for it. They proceed on the idea that the world owes them a living whether they earn it or not. They forget that in the very dawn of man's existence the stern edict went forth: "In the sweat of your brow shall ye eat bread." From that day to this no individual, family, tribe or nation has been able for long to avoid or escape this command and the perspiration mentioned—and as a general rule the more copious the sweat, the more abundant the bread.

America need have little fear from bolshevism. It is not indigenous or adapted to American soil. The early colonists in Virginia, once upon a time, tried a communistic experiment. Those who survived were well satisfied to go back to a more individualistic system of existence—the only system since the world began that has assured enough and to spare for those who were sufficiently industrious to put forth reasonable effort.

The people of the United States in the recent bomb outrage are getting a practical demonstration of the means and methods employed by the radical soreheads. It makes little difference by what name we call these extremists—we may judge of their motives by their deeds. Evidently they seek to rule without first having learned to respect and obey existing law.

THE LABOR SITUATION

EDITED BY R. DAWSON HALL

General Labor Review

Operators who are losing their men to Europe in great numbers will be keenly interested in a bill presented on May 19 in the House of Representatives by Mr. Lufkin. (House Bill 61.) Mr. Lufkin would prohibit immigration for a period of four years. Certain exceptions, however, are made—"Government officials, their families, attendants, servants and employees, ministers or religious teachers, missionaries, lawyers, teachers, students, authors, chemists, civil engineers, artists, physicians, and travelers for pleasure, business or curiosity, or their legal wives or their children under 16 years of age who shall accompany them or subsequently apply for admission with the purpose of joining them."

This bill practically excludes all those who would be likely to join the ranks of mine labor and practically admits all those who might possibly stir up trouble. Alien lawyers, teachers, students and authors are often extremely undesirable citizens, whose sole aim in life is to set their fellows by the ears and create dissatisfaction. It seems almost impossible to comprehend why we should admit the lawyers of foreign lands. The thought presses on us that the act will strain out the workers and let through all the trouble makers and labor exploiters. It is well known that much of the dissatisfaction of aliens with American conditions is due to ill treatment of labor by educated sharks of their own nationality whom the laws only inadequately restrain.

Another clause admits otherwise inadmissible aliens "who shall prove to the satisfaction of the proper immigration officer or the Secretary of Labor that they are seeking admission to the United States solely to avoid religious persecution in the country of their last permanent residence whether such persecution be evidenced by overt acts or by laws or government regulations that discriminate against the alien or the race to which he belongs because of his religious faith."

This exception has little effect on the mining industry for the religiously persecuted who arrive in the mining regions—to dig coal at least—are few. A few Doukabors, or spirit wrestlers, might possibly find their way to the mines, though they are farmers rather than mine workers. But it is possible that the Russians will no longer persecute them, now that the Russian state church is overthrown. The religious behavior of the Doukabors is most objectionable to us, and if they came here they would probably be more severely persecuted in our villages than in those of Russia where the moral law is not so closely enforced. In Canada they have been driven by droves into jail.

A few persecuted "Old Catholics," also from Russia, have come over in the past and found their way to the mines, and, while hard to deal with, they make good workmen, but they are extremely few in number. A few Serbians and Bulgarians may also be expected for there are many religious and ethnic quarrels and injustices where their populations overlap.

But these possibilities are interesting rather than important. The majority of those who are here and will come here as an outcome of religious persecution are found now and will be found hereafter in our big cities. The mining region will not draw labor strength from among them. After the war perhaps the dominant churches of the past may be persecuted by the adherents of no faith at all in a degree and manner recognizable by the Secretary of Labor, but this is hardly likely, and it seems therefore, as far as the mining region is concerned, that the act practically excludes all alien workmen. Before the war, under such an act as this Jews, Armenians and Syrians would

have been practically America's only visitants, and they would all have flocked to the big cities. As Armenia and Syria will now be in the hands of friends, the Hebraic people will probably be the only would-be immigrants who will be admitted under the provisions of the Lufkin act, if the law is passed. From them the mining population will not receive any noticeable accretions. Perhaps it will be admissible to point out that it is no more excusable to persecute persons for their racial origin than to harry them for their religion, or for both their race and their faith, and if the gate is thrown open to the victims of ethnic persecution a somewhat larger number of aliens will be admitted.

There are exceptions in the act which permit skilled labor to enter as under the third section of the act of Feb. 5, 1917, and also providing for the admission of those who come under the joint resolution of Congress of Oct. 19, 1918, which authorizes the readmission of certain aliens who have been conscripted or have volunteered for service in the armies of the United States or cobelligerent forces.

This proposed enactment needs the careful attention of all employers. If it seeks to prevent the Bolsheviki from entering the country it may be well said that it seems hardly likely to effect that result. Only complete exclusion of all aliens, persecuted and unpersecuted alike, will do that. Such a drastic step Mr. Lufkin hesitates to take.

ILLINOIS MINERS NOT TO PAY DUES TILL SEPTEMBER

Illinois members of the United Mine Workers will not have to pay organization dues during June, July and August unless the local itself insists on the payments for its own fund.

Frank Farrington, president of the state organization, has so advised the 350 local unions in Illinois. It is expected that the action will reduce the burden of the high cost of living for 85,000 men while work is slack.

The notice says "if work does not improve during the three months named, the executive board will give consideration to the matter of extending the period, otherwise local unions must resume the payment of per capita tax and the 1 per cent. assessment to the district office for the month of September."

The first labor celebration held in Ziegler, Ill., since the historic miners' strike there 15 years ago, was held during the past week. The mine is now completely unionized. The particular occasion for the celebration was the inauguration of increased passenger service on the Illinois Central R.R. Addresses were made by President Frank Farrington of the Illinois Mine Workers and others. Ziegler is now a town of 3000 inhabitants and is growing rapidly. Joseph Leiter has just completed his \$1,000,000 mine, which will employ 1400 men when fully developed. It is claimed to be the most modern colliery in the United States and is planned for a daily capacity of 8000 tons.

SOME PETTY ANTHRACITE STRIKES

Two brief strikes occurred in the Lehigh field during the week. The contract laborers in a section of Hazleton shaft colliery of the Lehigh Valley Coal Co. went out and returned three days later. The colliery was idle for nearly the whole week due to this cause and holidays. The steam shovel crews at Jeddo No. 4 colliery of the G. B. Markle Co. tied up that colliery for a day because back pay awarded by the "umpire" was not paid on the current pay-day. The matter was speedily adjusted and the colliery resumed work after a day's idleness.

Three late strikes in the Lehigh field have been brought about by the impatience of employees with the matter of the settlement of their grievances. Compared to the average county court, the board operated in a swift manner, and it seems pure folly to tie up a plant in order to hasten

a proceeding in which the union and the company are both factors and share in the tardiness of their board members.

CONDITIONS AND UNREST IN ILLINOIS

Riding to work in a high powered car is the latest fad among coal miners in the Connellsville region. The improved conditions among the laborers of the region were made possible by the wage scale which is yet in effect although overtime has been eliminated. Some days ago three Poles asked Superintendent Charles Opperman of Orient for a job. They got one as coal diggers. The next morning a graceful smooth running car valued at about \$3000 rolled up to the pitmouth and the three poles got out, unloaded their tools from the rear of the machine, preparing for their day's work as if they had been accustomed to just such things all their lives.

A call has been sent out to 246 locals of District 11 to meet in the Pythian Temple in Terre Haute, Ind., July 8. This will be the 27th consecutive and the 4th annual convention of the district. More than 200 delegates are expected to attend. Officers of the International Mine Workers' Union have been invited to be present.

Mining conditions in the Carterville district, Williamson County, Ill., are reported to be dragging, most of the mines hardly averaging two days a week. The labor situation was slightly relieved recently when the "Burr" mine resumed operations after being closed down for some three months. Mines 3, 8 and 9 of the Madison Coal Co. near Marion are reported as working from three to five days per week.

One hundred miners working at the West Virginia Coal Co.'s mine at Murphysboro are out on strike since Saturday, May 24. The reason the men give for striking is because Superintendent John Henderson, of St. Louis, refused to give a bond for guaranteeing their wages and they state that Henderson has failed to meet President Farrington, of the Illinois miners, for the purpose of arranging a bond to guarantee their wages. The West Virginia company operates eight other mines besides the one at Murphysboro, two being at Marion, one at Coulterville, one at O'Fallon and four near Belleville. It was thought at first when the Murphysboro strike occurred that the men working at the other mines of the company would strike also, but so far they are still at work at the other places.

Four hundred miners came out on strike Monday, May 26, at the mine operated by the Wasson Coal Co. at Harrisburg, Ill., and indications are that the men working in the mines near there will follow shortly. The trouble arose because C. M. Wasson, president of the company, signed an appeal bond of the Evans Coal Co., which recently went bankrupt while owing money to the men employed.

The treasury of the local union connected with mine No. 7 of the Big Muddy Coal and Iron Co. at Herrin, Ill., needed replenishing and the men voted to levy an assessment of 25 cents per man for that purpose. The mine officials found nothing in their agreement to permit this and refused to collect the funds. The result was that the men went out on strike and stayed out for a week before an agreement was reached.

Want Eleven Hours Pay for Eight Hours

On May 23 it was reported that the coal miners of District 18, which comprises eastern British Columbia and the Province of Alberta, would strike on Saturday, May 24, as a result of a disagreement which has arisen in the Crow's Nest Pass section of British Columbia over the pay of some employees whose working time is reduced by the recently-enacted Eight-Hour Day law, a regulation passed by the parliament of the Province of British Columbia. About 6000 men were expected to walk out, of which number 1600 were resident in the Crow's Nest Pass.

The trouble arises wholly in regard to the wages of the surface men, for the law has for some time made the eight-hour day compulsory underground. But the trouble really revolves only about 12 men, for the company has conceded that the bulk of the surface workers, whose day previously

consisted of nine hours, shall have the same pay for eight hours, but it refuses the same concession to foremen and others who have been working ten and eleven hours a day. The unions have had the matter under consideration for several weeks and, by an overwhelming majority, voted in favor of striking to uphold the claims of all workers to the same daily rate of pay under the Eight-Hour Day act as has been received heretofore.

According to the report of May 23 not only the miners but all the surface workers, including the engineers, were to be called out so that the situation in the collieries throughout District 18 would be serious unless some compromise could be reached without much delay. W. H. Armstrong, director of coal mining operations, endeavored to bring about a settlement, but his efforts were apparently unsuccessful, for on May 29 it was recorded that all the mine workers were out and that the railroad workers of Fernie with the Civic Light and Power Plant employees had struck in sympathy.

The British Columbia Federation of Labor recently telegraphed the Hon. G. D. Robertson, minister of labor, Ottawa, as follows:

"The executive board of the British Columbia Federation of Labor considers the refusal of an investigation into the condition of men who, by provincial legislation, are working eight hours in coal mines instead of eleven, and as a result have had their daily earnings reduced, is an action similar in effect to that which led to the Winnipeg strike. If nothing is done for these men and a strike results the Federation will be compelled to render them support in the only way possible. We have no desire to see any trouble in the West, but consider that the only way in which a strike can be averted is by granting an investigation."

Miners Clash on Zoning of Railroad Coal

Vigorous protest has been made to the Director General of Railroads by President F. C. Keeney of District 17, United Mine Workers, against the proposal to prohibit the Pere Marquette and other roads from purchasing West Virginia coal on the ground that the restriction would reduce the working time in West Virginia. A conference between President Keeney and President Moore of the Ohio United Mine Workers with Director of Purchases Spencer of the Railroad Administration has been suggested, the Ohio mine president being in favor, it appears, of the move to prevent the use of West Virginia coal on Western railroads. The president of District 17 has not only lodged a protest with the Railroad Administration, but with the international headquarters of the mine workers.

Strike for Electrification of Incline

About 300 miners employed at the Sprague and Skelton mines of the New River Co. in Raleigh County, West Virginia, went on strike and tied up operations for a week because the company refused to put in writing an agreement to electrify its switchback system. When District Inspector Sullivan visited the mines named above he found that 80 and 90 men at a time were riding the trips up and down the incline, whereas the law limits the number to 10. He immediately ordered the practice discontinued and a trolley system put in. This the company agreed to do, but miners insisted that the agreement be made in writing.

When the company refused to establish such a precedent the men went on strike and remained out for a week. W. J. Heatherman, chief of the department of mines, being called in to adjust the differences between the company and the miners. The men at one of the mines finally agreed to return to work on May 27, but miners at the other mine were still obdurate. The district officials were not a party to the strike. Committees of the miners stated in the course of a hearing that they no longer recognized any agreements covering the period of the war as being in effect or binding on them as the war was over. It is estimated that the company lost \$18,000 by the strike, as it had on May 28 a vessel at tidewater waiting to be loaded.

DISCUSSION BY READERS

EDITED BY JAMES T. BEARD

World's Production Record

Letter No. 1—Being a constant reader of *Coal Age*, I noticed the statement in an article relating to the development of a large coal field in England, that a certain mine near Mansfield "holds the world's record for output in a given time, 4850 tons having been brought to the surface in 7 hr., 40 min." *Coal Age*, Mar. 27, p. 567.

Appended to this statement, I was glad to see the footnote inserted by the editor, drawing attention to some American operations, namely, the Orient mine, of southern Illinois, and Vesta No. 4, near California, Penn. Allow me to add that the "Old Ben Mining Corporation, Mine No. 9, at West Frankfort, Ill., holds a record of 5305 tons of coal hoisted in 7 hr. 45 min., with 1386 dumps. This record was made in a single day's run, Feb. 18, 1919.

This mine has a remarkable average record of over 5000 tons of coal hoisted each working day throughout the months of February and March, with the exception of one day when the accident of a broken cage caused a shutdown at 1:30 p.m.

Regarding the reference made in the footnote just mentioned, allow me to say that our Orient friends have a 4-ton car, against our 3-ton cars. This fact gives them the advantage in the line of daily production. However, we are all proud that the world's record is held by mines in our town.

MINE MANAGER.

West Frankfort, Ill.

A.-C. vs. D.-C. Current in Mines

Letter No. 2—Some time ago, I read the letter starting a discussion of the use of alternating as compared with direct current in the operation of a coal mine, *Coal Age*, Feb. 20, p. 372. Since then, I have been hoping to see a number of letters on this subject, which I consider is an important one in its relation to mine safety and the economy of operating. It is disappointing to see how little interest the letter aroused among mining engineers and mine electricians.

It may be and probably is true that many, like myself, hardly feel capable of discussing the relative merits of these two types of electricity in mining, either from a theoretical or a practical standpoint. Personally, I have had several years' experience in the use of direct current in mines, but cannot say the same with respect to alternating current. For one, therefore, I would be glad to see this subject thoroughly discussed by those whose knowledge and experience are valuable.

The letter to which I have referred draws attention to the question asked at a recent meeting of the Coal Mining Institute of America; namely, "Is the underground use of alternating current more hazardous than the use of direct current?" With what little experience I have had in the use of alternating current, it is my belief that there is really less danger, or I would say there are fewer accidents occurring in mines using

alternating current than in mines where direct current is employed.

This statement may be challenged by many to whom it will appear strange, but it is the result of my observation, and I attribute the reason for fewer accidents being recorded with alternating current to the fact that mine workers have generally more respect for that current than they have for direct current. The latter is often made the means of playing practical jokes on fellow workers.

In a mine in this field where direct current was used, little thought was given to a man or a mule coming in contact with a live wire, in the general performance of his work. Since the direct current has been replaced by alternating current in that mine, however, a wide difference is observable. The men now have more regard for live wires, as they are not anxious to come in contact with them. Neither is there any fooling or playing with the wires by the practical joker.

DANGER DISREGARDED IN USE OF D.-C. CURRENT

This condition would seem to warrant the assumption that while the danger of alternating current is greater in case one comes in contact with a live wire, at the same time, if the recognition of the danger makes men more careful when working around wires carrying alternating current, it may be true that there is actually less danger in the use of alternating current than in that of direct current. Statistics ought to show whether or not this is actually the case, and I hope these will be forthcoming before this discussion is closed.

In conversation with another operator, in this field, he expressed the opinion that miners are more liable to become careless where direct current is employed than where the mine is equipped with alternating current. He stated that the general belief among miners is that if a man comes in contact with a live wire in the former case, he would be knocked down and thus lose contact with the wire; but an alternating live wire would hold the man coming in contact with it, and he would be unable to break away.

Now, whether or not this is true, I will not say. However, if it will keep men from taking chances that may result in injury or death, it is well that this belief prevails. The old saying is true in this case. "Where ignorance is bliss, 'tis folly to be wise."

When visiting mines where alternating current is used, I have invariably observed that the wires are strung in the air-course or in a blind entry that is not used as a travelingway. Where these wires are strung on a haulage road or in any passageway where men must travel, I have noticed that they are hung close to the rib and protected by boards or other means. High power lines are frequently heavily insulated. These extra precautions are not taken generally in mines employing direct current, as far as my observation goes.

Mining men who advocate the use of alternating current for general purposes in the mine, give a number of good reasons why this should be done: (1) Ease of

transmission. (2) Less motor trouble due to the burning out of armatures. (3) Less frequent machine repairs required because of the overloading of coal-cutting machines. These and other good reasons are advanced in favor of the use of alternating current.

It is probably true that many *Coal Age* readers have had much experience along this line that would be of interest to us all, and it is to be hoped that we shall hear from such. Some years ago I worked in a mine in West Virginia where 500-volt direct current was used for hauling coal with motors, and a 60-cycle, 3-phase, 300-volt, alternating current was used for cutting the coal, pumping and operating booster fans. I would like to hear an expression of opinion as to which of these installations is the more dangerous in mining practice.

Cleaton, Ky.

OSTEL BULLOCK.

Barometer vs. Outflow of Gas

Letter No. 4—Referring to the letter of E. P. Brennan, *Coal Age*, Apr. 3, p. 634, the writer seems to be in doubt as to the reason for the slowness with which barometric changes take place. He appears to ask why it is that the indications of the barometer are late; or, in other words, why it is that an increase of gas is detected in the mine, before there is any apparent change in the barometer. According to his statement, Mr. Brennan cannot understand why a properly constructed barometer will not adjust itself simultaneously with any change in atmospheric pressure.

After revolving this question in my own mind, it seems to me that the late response of the mercury column to atmospheric changes is only what should be expected. The barometer is a mechanically constructed instrument and naturally takes a little time to react, under a change of pressure that would affect a body of gas very quickly.

Practically speaking, I believe that the gaseous condition in mine workings may become very dangerous, before its cause is indicated by an observed change in the height of the mercury column. If I am wrong in this conclusion I should be glad to be set right. It is a matter of much importance in its relation to the safety of the mine.

JOSEPH R. THOMAS.

Plymouth, Penn.

Reducing Ventilation at Firing Time

Letter No. 8—Many interesting letters have appeared in *Coal Age* discussing this subject, and a wide diversity of opinion is manifest. From reading the arguments set forth by the writers in favor or in opposition to this method of reducing the liability to explosion in mines, one would be unable to decide which is right or wrong.

Personally, aside from the seriousness of the subject, I cannot help being amused at some of the criticisms that are offered by opponents who contend that such a method is dangerous to employ in the operation of a coal mine. Studying the subject from their viewpoint, I cannot but feel that these opponents are radically wrong. Otherwise, I must have a charmed life, being the originator, as I believe, of this system and having practiced it for many years. Let me say that if the arguments presented were true, I would not be here to write this letter.

A few of the older readers of *Coal Age* will remember that some 5 or 6 years ago, I gave at some length, my experiences in experimenting on this method of reducing the liability to explosion caused by the firing of shots in mines (*Coal Age*, Vol. 2, p. 838; Vol. 3, pp. 24, 156). All will agree that the experiments recorded in those letters contradict everything that we have been taught in regard to the prevention of dust explosions in mines.

However, those experiments and an experience of 42 years in coal mines, together with an education that enabled me to secure first-class certificates for every position in coal mining, have convinced me that the system is correct and that its opponents are deluded and have not discovered the fundamental principle underlying the origin of these explosions.

My greatest ambition has been to prove to mining men that, to reduce the ventilation in a mine, at the time of firing, lessens the chance of an explosion occurring as the result of blasting. Following up my experiments, two years ago I accepted a position as shotfirer with the Central Coal & Coke Co., Mine No. 45, Crawford County, Kan. Prior to that time, the mine had had many explosions in which shotfirers had lost their lives.

THE PRACTICAL TEST APPLIED IN A GASEOUS MINE WHERE MANY EXPLOSIONS HAD OCCURRED

Deciding that this mine would make a good testing station where the danger of dust explosion could not be disputed, I applied the method of completely shutting off all ventilation from the working places, before firing the 300 shots in 2½ hours each night. Such had been my practice during the past 28 years, in the worst mines in Kansas, including Mine No. 15 of the Western Coal & Mining Co., at Franklin, which holds the world's record for explosions.

Mine No. 45 where I am now employed contained unlimited quantities of inflammable coal dust, many of the places being marked up each morning, by the firebosses, as containing firedamp. The practice was to blast the coal off the solid. Many of the holes were drilled 8 ft. on the solid, being started in the back of the cutting. About 80 per cent. of these holes were charged with black powder, the average weight of charge being 6 lb. The remaining 20 per cent. were charged with dynamite, such holes being drilled straight in the solid. In firing the shots, I used fuse and would light as many as 40 shots at once.

I do not imagine that anyone will question these statements of facts, but I invite investigation, with the full consent of the management of the mines, and will demonstrate that an explosion cannot occur in this mine when the air is shut off.

But someone will ask, here, "Has an explosion occurred in Mine No. 45, during the two years of your employment as shotfirer?" I answer, "Yes." An explosion occurred in one instance when the foreman had been instructed to make a new air connection in a position that made it impossible to cut off all the air.

A shot had been prepared in that place and, while it conformed strictly with the requirements of the mining law, I refused to fire it, unless a sufficient length of fuse was provided to enable me to reach the surface before it would explode. I predicted that the shot would cause trouble. The mine foreman complied with my demand, and I ignited the fuse and was on top when the shot

went off. The explosion blew the trapdoor into a thousand pieces, and caused other wreckage.

My contention is that explosions do not occur now in this mine, because the chief factor producing them has been removed by completely cutting off the ventilation from the mine, at the time of firing. It is my hope that these experiments will prove of value to shotfirers who are striving to protect themselves to the best of their knowledge and ability.

Ringo, Kan.

ALEXANDER MCALLISTER.

Roof Conditions in Longwall Work

Letter No. 4—Referring to the proposition presented in the inquiry in *Coal Age*, Mar. 27, p. 591, it appears to me that the conditions mentioned there are ideal for longwall working if proper care is taken in performing the work. Those familiar with this system of mining know that it is important that no posts be built into the packs or permitted to stand in the waste, but all timber must be drawn as the face advances, in order to allow a uniform and gradual settlement of the roof.

The plan I prefer to adopt, in working a longwall conveyor face on the advancing system, is that shown in Fig. 1. This plan differs from that often shown, in



FIG. 1. SHOWING CONVEYOR FACE AND ROADSIDE AND GOBPACKS

one or two respects. First, besides the ordinary roadside packs, there are one or more continuous gobpacks. The roadside packs are usually 9 ft. in width, while the gobpacks may vary from 9 to 15 ft., in width, according to the amount of material on hand for building them.

Again, as shown in the figure, the conveyor is here laid between the first and second rows of posts, instead of in front of the first row, which affords a better support of the roof at the coal face. It is my belief that building the gobpacks, previously mentioned, affords a more uniform settlement of the roof and goes far toward preventing any sudden breaking of the roof at the working face. These packs must be well built though not too solid, and extended regularly as the face is advanced. Timbering should be conducted in such a manner as to throw just enough pressure on the face to break down the coal after it has been properly mined. As stated in the reply to this inquiry, the roof should not be permitted to break at the face if this can be avoided.



FIG. 2. SHOWING CROSS-SECTION AT CONVEYOR FACE

Fig. 2 is a cross-section of a conveyor face. On the left, is shown the coal undermined and the position of the conveyor between the first and second rows of props. On the right, the mined coal has been loaded out and the first row of props and the conveyor moved forward. The posts in the last row must now be drawn and set next to the conveyor, and the packwalls extended.

If the fireclay is of a good hard material, it will serve to make good packwalls. I have found by my own practical experience that there is none better. But if the fireclay is of a soft nature and crumbles readily when exposed to the air, it may be necessary to brush the roof in order to obtain good material for the packs.

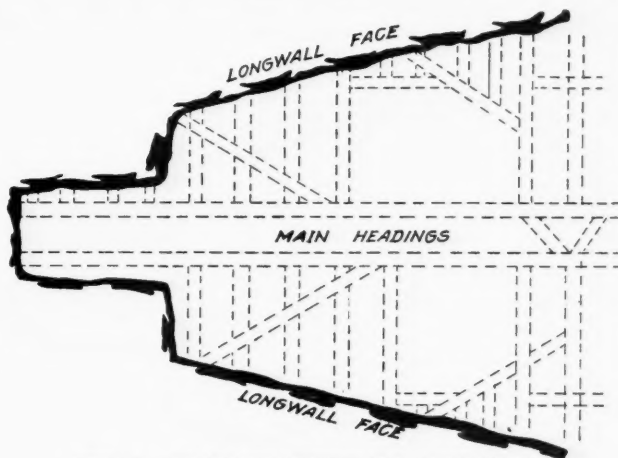


FIG. 3. PLAN OF LONGWALL ADVANCING

The hard sandrock overlying the coal is not good for packing, as it does not yield sufficiently to permit a gradual subsidence of the roof. The soapstone overlying the sandrock stratum makes better material and some sandrock can be used with it in building the packwalls.

In Fig. 3 is shown a plan of longwall advancing where no conveyor is used. In this plan, the gateroads are driven on 42-ft. centers, packs 8 or 9 ft. in thickness being built on each side of the road. Here, the cars are taken to the face where they are loaded by the men working each place. Under some conditions of roof, in longwall working, it is necessary to adopt a retreating plan and work the coal out in panels.

In Fig. 4, I have shown a panel system employing a conveyor face in each panel. This plan I have found

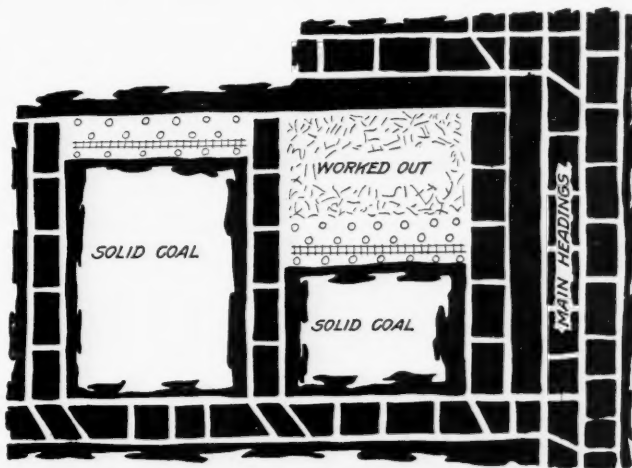


FIG. 4. A LONGWALL-RETREATING, PANEL SYSTEM

to work successfully where the nature of the roof requires the adoption of such a system. The main entries are driven three abreast and cross-entries turned to the right and left of the main entries, at suitable distances apart to form a good panel, say 100 to 150 yd. in depth.

As shown in the figure, a pair of butt headings, Nos. 1 and 2, are turned off the first pair of cross-entries, No. 1 butt being driven through into No. 3 cross-entry.

The purpose of this is to provide an extra air-course for the better ventilation of succeeding panels. A good pillar is left between these two butt headings, for the protection of this air-course.

Nos. 3 and 4 butt headings are now driven, at a distance of 300 ft. from the first pair of butts. This leaves a panel face of about 290 ft. in width. When these butt headings have been driven to the limit the panel is cut across at the face, and the work of drawing back the coal, on the retreating system, is commenced. A conveyor is used to convey the coal to the butt headings in the usual manner, and three rows of posts are kept behind the conveyor, to afford better protection at the working face.

At times, it is preferred to use a track along the face, instead of a conveyor. This track is supported on steel ties and is moved up as the face advances. Cars are then placed along the face as required by the men. Other panels are formed and worked in a similar manner; but when the second block has been worked out, the pillars between Nos. 3 and 4 butt headings are drawn back. The work of robbing the pillars should proceed as the panel of coal is taken out, which is far better than to allow the pillars to remain until the panel is finished. Each panel is drawn back to within 50 ft. of the cross-entries, so as to leave a sufficient pillar for the protection of the entries.

WILLIAM DICKINSON, SR.

Oak Hill, W. Va.

Letter No. 5—In presenting his proposition for suggestions, *Coal Age*, Mar. 27, p. 591, "Sandrock" has omitted to give some important data, such as the depth of cover, inclination of seam, presence or absence of water and gas, etc. Any suggestions offered must therefore be based on assumed conditions.

This being a thin seam, only 3 ft. 4 in. in thickness, either a conveyor must be used to convey the coal to the head of the main road, or gateroads must be built and kept open, at short intervals along the face. Assuming that the seam is flat or nearly so, it may be supposed that mules are employed for gathering the coal at the face. In that case, I would arrange to make the main roads 200 ft. apart, with temporary roads or gateroads 50 ft. apart. One mule would then be able to haul the coal from the three gateroads belonging to each main road, which would provide a good gathering haul for the mules.

TAKING UP THE CLAY BOTTOM PREVENTS HEAVING

By taking up the 3 ft. of fireclay, 10 ft. wide on the main road and 7 ft. wide on each gateroad, sufficient material would be supplied for building good roadpacks and, in addition, any trouble from the heaving of the floor would be eliminated. The 9 in. of sandrock overlying the coal would form a good support for the soapstone stratum immediately above.

It is my opinion that the sandrock in the overlying stratum would have sufficient elasticity to bend with the weight of the overburden, assuming a good depth of cover overlying this seam. In that case, the subsidence of the roof following the extraction of the coal would act as a lever to break down the coal after the face is mined.

At intervals of 200 ft. along the main road, diagonal roads should be started; and these, by cutting off the temporary roads or gateroads, would shorten the haul and liberate much tracking for use elsewhere in the

mine. Probably this would also save much back brushing required to keep these gateroads open.

Let me say, here, that it is not good mining practice to attempt to pack all void places solid, in longwall work. In the plan I have suggested, there would be a good waste between the high-side pack of one road and the low-side pack of the road next adjoining, 50 ft. away. As has been stated by other writers, all timber must be withdrawn from the waste, as fast as the working face advances, so that the only timber standing will be the temporary supports or rows of posts required at the face.

THE USE OF TIMBER COGS IN LONGWALL

Where cogs are used, one row of these is sufficient between the conveyor and the waste when operating a conveyor face in longwall. This row of cogs should be drawn and moved up as the face advances, so as to furnish the necessary protection for the conveyor. By this means, the roof has a good chance to sag down gradually in the waste, which will relieve the packs of a great deal of pressure and bring the desired leverage to bear on the coal face, which is the great concern in longwall work.

Referring to the practice of building a cog, to form the corner when starting a new packwall, it is my belief that this is a wrong method to pursue. The unequal resistance offered by the cog, which is always greater than that of the packwall, has a tendency to throw the weight too far forward on the face of the coal. This is frequently the direct cause of the roof breaking off at the face, which would defeat the chief aim of longwall work. It seems hardly necessary to add that a longwall face should be kept as nearly as possible in a straight line and not allowed to get zigzagged. Also, packwalls should be kept close up to the face.

Merritt, B. C., Canada.

J. TOUHEY.

Living Conditions at Mines

Letter No. 3—I read with pleasure the letter of A. A. Allen, *Coal Age*, Feb. 13, p. 331, and later that of "Optimist," April 17, p. 726. Like both of these writers, I have spent my life around the mines, living in three countries, during the past 31 years. I have always been an interested reader of the accounts of large coal companies doing good work in the improvement of living conditions at their mines.

To some who have regarded this matter with less interest, no doubt the idea of making extended efforts for the improvement of the living conditions of men working in mines may seem unnecessary and radical, but it is my belief that much good is and can be accomplished when these ideas are carried out faithfully. But it will be useless to improve the living conditions of miners and their families, unless equal effort is put forth to give the men a square deal in the mine. Generally, fair treatment of the men by the bosses will bring equally fair treatment of the company on the part of the men, which makes it a business proposition for both parties.

Beginning at the mine, everything should be done for the comfort and welfare of the men. As the old saying puts it, "Cleanliness is next to godliness"; therefore, a good wash-house at the mine is especially necessary and should be provided. Here, the men should be taught to wash themselves and change their clothing

before going home. This little item will prove a great factor in maintaining neat homes and surroundings in the camp.

For all the men, there should be provided comfortable houses where they can live with their families and enjoy pleasant surroundings. These houses should be equipped with lights, running water, bathrooms and living rooms. Each house should stand on its own lot and have its own garden and lawn. Good roads should be maintained in the camp; churches, schools and entertainment halls provided to make it a good place in which to live.

Speaking of schools, these should be equipped for the accommodation of both day and night students. At the night sessions, instruction should be given in the English branches and special efforts made to implant American principles in the mind of each student young and old. First-aid and mine-rescue work should be taught and rescue teams organized. The entire work should be conducted so as to inspire keen competition in the line of efficiency.

PROVISION MADE FOR RECREATION AND ENTERTAINMENT ALWAYS A GOOD INVESTMENT

Mention has been made, in the letter by "Optimist," of the average miner being a hard worker and showing the same spirit at play. For this reason, athletic sports, baseball and football fields, as well as playgrounds for the kids, must be provided in every good mining camp. For indoor recreation, there should be a gymnasium. A large hall could be erected at small cost for the purposes of entertainment, dancing, picture shows and other amusements.

Welfare work among the miners is not complete without a good company doctor, supported by the monthly subscriptions of the miners rated in proportion to their family needs. Also, a company or coöperative store should be maintained where the best grade of goods can be procured at the lowest possible prices. A coöperative store should be under the control or governed by a committee of miners and bosses, elected every year or half year.

As I have said previously, these ideas may appear somewhat faddish to some; but they can be handled in a manner to make each effort self-supporting, and the benefit to the men and their families will be found far-reaching and of equal advantage to the industry.

Clinton, Ind.

MINE FOREMAN.

Letter No. 4—The letter of A. A. Allen, on this subject, *Coal Age*, Feb. 13, p. 331, has struck a vital point, and his remarks are what we can all indorse. The fact is generally conceded that the more intelligent a workman is, the better work he does. But, being intelligent makes the man sensitive and, being sensitive, he cannot endure all things.

The intelligent workman and the one who gives the most efficient service naturally abhors the living conditions to be found at the average coal-mining camp. The same is true, also, in respect to the working conditions to be found in many mines. The man's training has fitted him for more congenial surroundings and he will not stay where the social conditions are of a low order, such as exist in camps where church and school privileges are lacking, the houses poor and ill-kept, the streets and sidewalks in bad condition, and cows, hogs and chickens roam promiscuously about.

Too often it is the case that the houses provided for the men have been built by contract, are poorly constructed of cheap lumber, and have no water, lights or other conveniences. It may be that they are located in a swamp or on low ground or, perhaps, on a steep hillside where approach is difficult and there is no opportunity for the cultivation of the ground and the making of a garden.

POOR WORKING AND LIVING CONDITIONS DESTROY THE AMBITION OF GOOD WORKERS

Working conditions and living conditions are twin sisters, and are commonly on the same order. Practical business management has come to realize that the successful development of a large operation depends equally on satisfying the men in both of these respects. In my own humble opinion, it would seem a good plan to build houses for the different classes of labor that are always to be found in the mines. It can hardly be expected that all the workers in a mine will be of the same grade or class. All have not the same ambition and desires.

There are men who are constantly seeking advancement and promotion to higher positions in life, and there are others who have no such ambition but are content to live on the same low level. To give to all of these men the same privileges, and expect the man of high ambition to be satisfied with the dirt and filth of his less ambitious neighbors would be to lower his ideals if, in truth, he would consent to stay where he was not accorded the privileges he has the right to expect.

Again, if the man of low ideals, living down in some back alley, is provided with the same conveniences that are given to one of higher ambition, the latter will have no incentive to better himself, but will often be satisfied to let things take their own course and make no effort to improve his surroundings. On the other hand, as men are quick to observe a difference in the treatment accorded to another, the desire is at once aroused in the man first mentioned to secure the same privileges and accommodations for himself.

EFFECT OF REWARDING FAITHFUL WORKERS

For example, here is Joe who keeps his little shack clean and tidy. The superintendent of the mine has noted that fact and offers Joe another place to live, where he will have a better house and a good chance to make a garden, knowing that he will take care of it. He has observed, also, that Joe is a good worker and has passed the word to the mine foreman to give him a chance.

In this manner, it is possible to build up a good, industrious body of men by improving both their working and their living conditions. The good workman has usually a good helpmate in the home, one who would not be satisfied to live in dirt and filth; but if compelled to do so, it will not be long before her discontent will create the same feeling in the man and cause him to wish to seek another place.

The last few years have proved conclusively that labor is our greatest asset. A wise management naturally dreads to see a good man leave its employ; but looking at the situation from the worker's standpoint, we cannot deny that we would do the same thing ourselves if placed in his position. Let us hope that these conditions will be improved steadily in our mines.

Osceola Mills, Penn.

S. D. HAINLEY.

INQUIRIES OF GENERAL INTEREST

ANSWERED BY JAMES T. BEARD

An Interesting Mine Haulage Proposition

We have under consideration a proposition to improve our haulage in the mine. At the present time, the distance from the working face, at the head of the face entry shown in the accompanying diagram, to the foot of the hoisting shaft, is practically 2½ miles.

The heavy broken line, *EFGBCD*, in the figure, represents the present main track or haulage road. It will appear that there is a slight upgrade from the working face to the point marked *A* in the sketch; but from that point out to the foot of the shaft there is a slight grade in favor of the loaded cars. These grades are indicated in the figure by the signs plus (+) and minus (—), the former meaning an upgrade and the latter a downgrade toward the shaft.

Two plans have been under consideration, the first being to utilize the track that still lies in the old entry

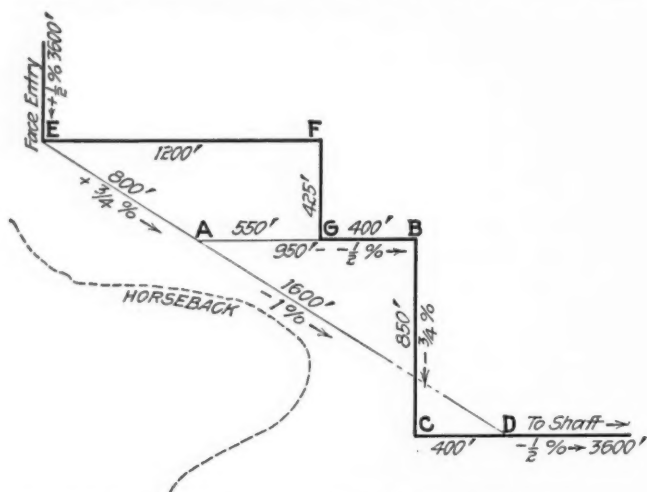


DIAGRAM OF PRESENT AND PROPOSED HAULAGE ROADS

from *A* to *B*, bringing the coal out by the route *EAB*, instead of *EFGB*, which would shorten the distance of haul 275 ft. By the second plan, the coal would be hauled out over a straight road *EAD*, instead of by the present route *EFGBCD*, which would shorten the haul 875 ft. between the points *E* and *D*.

As previously stated, track is already laid and in use from *A* to *G*, and on the main haulage road *EFGBCD*. The entry *EA* has been cut through and is ready for the permanent track; but the extension from *A* to *D* is not completed, a distance of 100 ft. still remaining to be cut through, as indicated by the dotted line where this entry crosses the main track *BC*. This portion being left had the advantage of not interfering with the circulation or disturbing conditions on the main haulage road until everything was complete to make the proposed change.

Moreover, there are two bad faults that must be cleaned up on this entry, before track can be laid and the road utilized for hauling coal. This work, to-

gether with the timbering of the entire entry from *E* to *D* will mean a considerable expense, in addition to the necessary outlay for tracking and ties, all of which must be taken into consideration in determining the practicability of making this change at the present stage of development of the mine.

It is estimated that we have some two million tons of coal in sight. We are using electric haulage, the present capacity of the motors being 24 trips a day, hauling 50 tons in a trip and producing a daily output of 1200 tons of coal. The haulage road is now double-tracked from *B* to *C* and thence out to the shaft. There is some double track also inside of *E*, on the face entry. The proposed road *EAD* would have but a single track. There is some double track also inside of *E*, on the face entry. Referring to the first proposition, the cost of fixing up the *ABCD*, for permanent haulage, may be considered as equal to the expense of laying track from *A* to *D*.

The question that we are at present considering is, Will the future life of this mine justify making the proposed change in the main haulage road? It is a problem on which we have been figuring for some time. In fact, as will appear from the work already accomplished, the plan had been practically adopted once and the work started and then abandoned for a time, till better conditions should prevail in the coal-mining industry.

We believe that many of the practical readers of *Coal Age* can outline, in a general way, to what extent the saving effected by the proposed change would justify the outlay for that purpose. Suggestions along this line will be greatly appreciated.

J. H. DICKERSON.

Cambridge, Ohio.

We gladly submit this proposition to our practical readers, inasmuch as it presents an opportunity not only for a fair explanation of the work required, but also for the display of good practical judgment in regard to the requirements in underground haulage, in the development of a large mine.

While our correspondent has not stated the thickness of the coal or the height of the entries on the haulage roads, it may be assumed that this is a good workable seam of coal and overlaid with a generally good roof that has made possible the use of a considerable length of double track, on the present haulage roads.

The fact that there are two bad falls that must be cleaned up on the extension *AD*, which was driven some time since and allowed to stand, may be attributed to faulty roof conditions in proximity to the horseback indicated by the dotted outline in the figure.

The proposition is one that will often arise in the operation of coal mines, and we hope that it will receive the attention that it should demand. The systematic estimation of the probable costs, while they may vary from the actual expenditure for labor and material, cannot fail to be of deep interest to all who have similar problems with which to contend.

EXAMINATION QUESTIONS

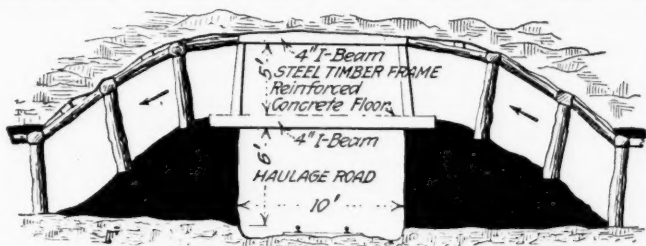
ANSWERED BY JAMES T. BEARD

British Columbia Examination First Class, Nov. 20, 1918

(Selected Questions)

Ques.—Give a sketch of what you consider a good overcast; such sketch to show dimensions and other details sufficiently complete to construct the same.

Ans.—In the accompanying figure, is shown an overcast conducting an air current across a 10-ft. haulage road in a 6-ft. seam of coal. This overcast is constructed by blowing down the roof over the haulage road, to a height sufficient to give a sectional area above the floor of the air-bridge equal to the sectional area of the air-course. An uprise is then driven from the air-course to connect with this excavation in the roof



AN ECONOMICAL AND WELL BUILT OVERCAST

above the haulage road. A similar connection is made with the cross-entry air-course, on the opposite side of the haulage road, as shown in the figure.

A reinforced concrete floor or bridge is then constructed by spanning the haulage road with two 4-in. I-beams, one at each side of the excavation in the roof. These I-beams are given a good foundation on the top of the coal forming the ribs of the haulage road. Cross-bars of steel rails are laid at intervals and supported between the two I-beams. When this framework is in place, a temporary board bottom is constructed and a solid floor of concrete laid to a depth of 6 in., embracing the cross-rails and forming a solid joint with the I-beams on either side and the rock wall of the excavation that now forms the rib of the overcast.

Care must be taken to make everything air-tight between the haulage road and the overcast, to prevent the leakage of air into the roadway. The connecting drifts on either side of the air-bridge are securely timbered and braced, as shown in the figure, after setting the steel timber frame above the haulage road, as indicated, for the support of the roof above the air-bridge.

Ques.—A current of 140,000 cu.ft. of air is delivered at the foot of a downcast shaft and there divided into three splits as follows: Split A, 6 x 7 ft., 5000 ft. long; Split B, 6 x 6 ft., 4500 ft. long; Split C, 6 x 5 ft., 4000 ft. long. What quantity of air will pass through each airway?

Ans.—The first step in finding the natural division of the air current between these three splits is to calculate

the potential factor for each split. Thus, reducing each factor to its lowest terms,

$$A, \quad a \sqrt{\frac{a}{lo}} = 42 \sqrt{\frac{42}{5000 \times 26}} \quad 7 \sqrt{\frac{7}{10 \times 13}} = 1.624$$

$$B, \quad = 36 \sqrt{\frac{36}{4500 \times 24}} \quad 6 \sqrt{\frac{6}{9 \times 12}} = 1.414$$

$$C, \quad = 30 \sqrt{\frac{30}{4000 \times 22}} \quad 5 \sqrt{\frac{5}{8 \times 11}} = 1.192$$

$$\text{Sum of potentials} \dots 4.230$$

In finding the natural division of air, the work is much simplified by taking the lowest values for the area, length and perimeter, by striking out common factors in each of these. For example, in the above three splits, the sectional areas, 42, 36, 30, have a common factor 6, which divided out gives for the relative areas, 7, 6, 5. In like manner, the lengths 5000, 4500, 4000, are reduced to 10, 9, 8; and the perimeters 26, 24, 22 become 13, 12, 11. These relative values are then used to calculate the relative potential factors, as shown on the right, above.

The quantity of air passing in each split is then proportional to the relative potential for that split, and we have

$$A, \quad q_a = \frac{1.624}{4.23} \times 140,000 = 53,750 \text{ cu. ft. per min.}$$

$$B, \quad q_b = \frac{1.414}{4.23} \times 140,000 = 46,800 \text{ cu. ft. per min.}$$

$$C, \quad q_c = \frac{1.192}{4.23} \times 140,000 = 39,450 \text{ cu. ft. per min.}$$

$$\text{Total} \dots 140,000 \text{ cu. ft. per min.}$$

Ques.—If 65,000 cu.ft. of air per min. passes through an airway 7 x 7 ft., with a water gage 1.5 in., what quantity of air will pass through another airway of the same length, 8 x 8 ft. in section, the pressure remaining the same?

Ans.—In this case, the length of the airway and the pressure per square foot being the same, the quantity of air circulating in each is proportional to the poten-

tial factor $a \sqrt{\frac{a}{o}}$. For the first airway $a = 7 \times 7 =$

49 sq.ft.; $o = 4 \times 7 = 28$ ft. For the second airway, $a = 8 \times 8 = 64$ sq.ft.; $o = 4 \times 8 = 32$ ft. The potential factors for these two airways are therefore,

$$\text{Airway } 7 \times 7, \quad 49 \sqrt{\frac{49}{28}} = 49 \sqrt{1.75} = 64.82$$

$$\text{Airway } 8 \times 8, \quad 64 \sqrt{\frac{64}{32}} = 64 \sqrt{2} = 91.51$$

Finally, for the same pressure, the quantity passing being proportional to the potential, the quantity ratio is equal to the potential ratio, and we have

$$\frac{x}{65,000} = \frac{91.51}{64.82} = 1.396$$

$$x = 65,000 \times 1.396 = 90,740 \text{ cu. ft. per min.}$$

FOREIGN MARKETS AND EXPORT NEWS

EDITED BY ALEX MOSS

Latest Developments in the Export Coal Situation

New Department Created by Shipping Board Will Handle Question of Vessels—Every Effort Being Made to Expedite Matters So That America's Foreign Coal Trade May Become a Reality

Ships are available to carry American coal abroad. This is the most important development when the frenzied discussion of the export situation, which has been in progress for ten days, is summed up. The Shipping Board has created a department of coal exports. Through this new department it expects to do all in its power to facilitate the exportation of American coal. In order that its cooperation may be of the most intelligent kind, the Shipping Board called a meeting of representatives of producers, exporters and brokers. The meeting was held May 29 and resulted in an all-day discussion of the export situation.

It is not the intention of the Shipping Board to allocate a certain amount of tonnage to the coal industry at this time, but it is expected that a business-like handling of coal exports will allow this country to get into the world's coal trade in an important way and at the same time to furnish outbound cargoes for shipping which must be dispatched to bring back cargoes from other countries. The meeting developed the fact that the chief obstacles to be overcome are by no means insurmountable, and it was decided that the Shipping Board would send out a questionnaire at the earliest possible moment so as to secure in orderly fashion the consensus of opinion on disputed questions and in order to furnish the Shipping Board with a more definite idea of the number of operators who are willing to enter the export trade.

In announcing the creation of its department of coal exports, the Shipping Board issued the following statement:

Statement of Shipping Board

"The Shipping Board is greatly interested in developing American coal exports, but as so much of our tonnage had to be devoted to food relief service we have not had the necessary ships to adequately serve the trade. Happily, the time has now come when we can plan in a constructive way for the development of our coal exports, and, recognizing the importance of this work, and in order to carry it forward, the Board has authorized the creation of a new department of the Division of Operations, to be known as the Department of Coal Exports.

"After a very careful canvass of the field for a man with the necessary qualifications and at the same time unbiased by any connection with the industry itself, we have selected H. Y. Saint, formerly Director of the Foreign Trade Bureau of the Seattle Chamber of Commerce, to take charge of the new department.

"The Department of Commerce, the Fuel Administration and the Foreign and Domestic Trade Bureau of the State Department have been requested to cooperate with the new Department of Coal Exports."

That the National Coal Association is impressed by the action taken by the Shipping Board is shown by the following statement made by J. D. A. Morrow, who is in active charge of the Association:

"Opening foreign markets to the American coal trade, as contemplated by the Government in the creation of the new Department of Coal Exports, announced by the Shipping Board, will provide the industry, it is believed by representative operators, with a new and powerful stimulant which should quicken production toward the pace that must be maintained if a serious shortage in home markets is to be averted next fall and winter.

"For months the coal industry of the United States has been unable to supply even a small percentage of the millions of tons of coal needed in foreign markets. This has been entirely due to the shipping situation, the first call on ships being for the homeward transportation of troops and the outward flow of foodstuffs to Europe.

In the meantime, while almost every nation under the sun has been calling for coal, American mines have been producing from one-third to one-half their full-time output—in some fields, even less.

"The situation has now been reached where there must be a decided increase in production if our own needs are to be met in this country. That increase can be effected only by the entrance of buyers into the market. Mine forces cannot be kept together and mines cannot operate if there are not orders to fill. American buyers have not been in the market during the past few months to the extent necessary to enable operators to do more than keep their forces together. The men are going and have gone, in many instances, into more regular and less hazardous employment. Also thousands of miners are today at Atlantic ports, awaiting passage to Europe.

Coal Exports Would Stimulate Mining

"The entrance, therefore, of foreign buyers into American coal markets should help in keeping together forces necessary to produce coal to meet not only foreign requirements, but needs in the United States next fall and winter.

"Unless the United States can ship its coal abroad there is every indication that there will be a world-wide shortage of coal next winter. No other country can supply the demand. In Great Britain production has dropped to levels far below the pre-war days. It is regarded as virtually impossible that Great Britain can mine the coal that the world will need. She is not producing it in sufficient quantities now, and the rationing system, under which consumers may obtain only a limited supply, will be continued, it has been announced, in the United Kingdom for months to come, notwithstanding the fact that hostilities ceased more than seven months ago.

"The coal mines of France will not produce their pre-war output for from three to six years, engineers estimate, while in Russia the situation, so far as next fall and winter are concerned, is regarded almost as hopeless. Wholesale bankruptcy threatens the coal industry in Germany—indeed, in many instances has already overtaken it—as the result of revolutionary changes in governmental policy affecting the industry and because of general labor disturbances. A shortage characterized as acute exists in Australia, the one remaining large source of supply. Only in Spain, which does not produce enough to meet its own needs, has coal production been on the increase during the year, and in Italy, where a small quantity of lignite, far from sufficient to meet Italian needs, is mined.

Whole World Looks to America

"The entire world, with the exception of the United States, is in the throes of a universal coal shortage today and only the most sweeping increase in production wherever coal is mined can avert world-wide suffering next winter. More than one hundred million tons of coal could be sent out from the United States during the remainder of the year, were there ships enough to carry it, without meeting in full the foreign demand."

It is very clear, from the discussion at the Shipping Board meeting, that practically all those contemplating exports favor the adoption of the Welsh charter. The variations from that charter, which have been used by the Shipping Board, were said to cause much confusion and to work against the interests of the American shipper. Not much enthusiasm for Government inspection of coal was evidenced. Some of the advantages of such a plan were recognized, but it was declared that responsible exporters will keep up the quality of their coal and that the situation is

one which will handle itself. The advantage of having an analysis of the coal accompanying the invoice was admitted generally.

There was a tendency on the part of small shippers to fear that they would have difficulty in securing equal rights with larger exporters, but they apparently are willing to put themselves in the hands of the Shipping Board.

All agree that a much more satisfactory condition has been brought about by concentrating in the one office all matters pertaining to coal exports. Mr. Saint, who is in charge of the coal department of the Shipping Board, was born and reared in western Pennsylvania and has a knowledge of the problems surrounding production. His experience on the Pacific Coast has been with foreign trade. These advantages, as well as his capacity as a businessman, recommended him to the Shipping Board for the place.

Mr. Saint has appointed a committee to inquire into the demand of insurance companies that shifting boards be used in loading bituminous coal. Such a requirement, it was pointed out at the meeting, would add \$2000 or more to the cost of loading each ship.

Netherlands Coal Supply

Trade Commissioner Arthur H. Redfield reports from The Hague under date of Apr. 18, 1919, that the Netherlands Coal Distribution Office (Rijks-kolendistributie) has recently given out figures of the production and importation of coal, lignite and peat for the years ending Mar. 31, 1916, to 1919, which have been allotted by that office. As peat was first included in the distribution system at the end of April, 1917, no exact statistics of its shipments are to be had before that date, and the figures given below for 1916 and the first months of 1917 are based upon an estimate. The shipments of peat and lignite, moreover, are given in terms of their fuel equivalent in coal. The amounts stated are in metric tons and are for the year ending March 31.

Countries	Years Ending Mar. 31		
	1917, Metric Tons	1918, Metric Tons	1919, Metric Tons
Imported from Germany.....	3,377,533	2,761,110	735,100
Imported from England.....	1,295,722	201,012	92,376
Imported from Belgium.....	619,439	169,877	84,491
Imported from United States.....	84,491
Total imports of coal, coke and briquets.....	5,292,694	3,131,999	947,647
Shipments of coal from Limburg.....	2,553,577	2,980,318	3,210,149
Shipments of peat*.....	400,000	450,000	650,000
Shipments of lignite*.....	46,053	526,886
Total domestic coal, peat and lignite...	2,953,577	3,476,371	4,387,035
Grand total.....	8,246,271	6,608,370	5,334,682

* Converted to fuel equivalent in coal.

The figures in the table regarding the Limburg mines differ from the ordinary published figures, in that the figures for shipment are given instead of the total production of the mines, from which must be subtracted the coal consumption at the mines. In the period from Apr. 1, 1918, to Mar. 31, 1919, as compared with the corresponding period of 1917-18, a greater quantity of domestic fuel was available,

amounting to over 900,000 tons of coal, while over 2,000,000 metric tons less coal was imported from foreign countries. As compared with the year 1916-17, there were in the year 1918-19 almost 1,500,000 metric tons more available from domestic production and 4,400,000 tons less were imported from abroad.

Lancashire Coal Export Trade

In the course of an interesting article dealing with the Lancashire coal trade the "Statist" says that Lancashire is the fourth of the coal-producing counties in the United Kingdom, and in 1917 its output amounted to 21,760,000 tons, compared with 40,875,000 tons in Yorkshire, 32,133,000 tons in Glamorgan and 30,843,000 tons in Durham. The bulk of the coal raised is used locally for industrial and domestic purposes, but the export trade is considerable, especially in bunkers. A large coast-wise traffic is also done to Ireland and the Isle of Man.

The trade has, for special reasons, not suffered material detriment during the war. The bulk of the coal shipped from England comes, in normal times, from the Bristol Channel and from the northeastern ports, both Welsh and Yorkshire coals being of the highest quality and easily standing transportation. The Admiralty commandeered a large proportion of the output of these districts, especially of the best coals, and Cardiff, Newport and Swansea, as well as Newcastle and Hull, were too busy meeting the requirements of the English and Allied navies to fill civilian needs. Only second-grade steam coal was available for export, and even this was often replaced by inferior qualities.

Users Like Lancashire Coal

Many foreign and home consumers turned to Lancashire coal, and, it is reported, were favorably impressed by its calorific power and by its adaptability for many purposes. Bituminous coal is naturally more easy to light and burns with a characteristic flame which is altogether absent from anthracite, but in heating capacity it is generally inferior. Both on sea and land, the Lancashire product has been extensively used during the war in steam-raising plants which formerly used only Welsh or Yorkshire coals, and, though results naturally varied with the type of boiler and with the arrangements for draft, the general verdict was one of surprised satisfaction.

It is probable, in the circumstances, that the new clientele attracted to Lancashire coal for the want of better will remain permanently with it. A practice, common in the United States, of purchasing coal for analysis, is coming increasingly into vogue in England, and the practice will benefit Lancashire coal, which, though showing a good return in calories and a low percentage of ash, has not the reputation attaching to the famous seams of Yorkshire and South Wales.

At present foreign importers are not inclined to haggle about prices, and therefore the problem of restoring England's export trade in coal hinges solely on output. In the absence of any calamitous social or industrial developments, output should rise above the war standard with the demobilization of able bodied miners and the execution of long overdue repairs, renewals, and improvements to mechanical equipment. The ultimate effect of the reduced hours on output is too problematical to discuss, but in Lancashire the best opinion views the matter in a very hopeful light.

British Coal Output Decreasing

The output in the United Kingdom had been decreasing long before the war. The average per underground worker which in 1905 was 360 tons, had fallen in 1913 to 321 tons, but it is expected that its downward course will now be stayed through better working methods and through the exercise of good will on the part of miners. Most of Great Britain's rich shallow seams have been exhausted, and the raising of coal from thin seams at great depths necessarily involves increased expense.

The rapid decentralization of industry in the last 50 years, and the more even distribution of manufactures over the world, naturally caused a slackening in the rate of industrial development in Great Britain, and her coal exports did not increase comparably with those of other countries. To prevent unemployment on a large scale, it is advocated that English exports be resumed as soon as possible, free from official interference. Her railways, docks and ships derive profit from the trade, which also enables her to import more cheaply her requirements of food and raw

Foreign Coal Trade Opportunity

A firm in Malta is proposing the opening of an American shipping and coaling department, and desires to communicate with steamship owners and coal-mining companies. References. Further details may be obtained by writing to the Bureau of Foreign and Domestic Commerce, Washington, D. C., or any of its branches, and referring to File No. 20,490.

materials. Further, English coal is needed in foreign coaling stations for the use of British steamers, and many of her outward-bound ships can, by securing a coal cargo, avoid a profitless journey in ballast.

The complete resumption of coal exports by Great Britain is conditioned by the supply of shipping, but, according as it is provided, it is expected in Lancashire to stiffen prices in the home market. Foreign wants are imperious and must be satisfied, and, moreover, Germany, England's principal competitor before the war, is for a time out of the market. At present under the control system Lancashire coal for export is on an average from 6s. to 8s. per ton dearer than for home consumption, and naturally merchants prefer to ship, but are hindered by the embargo. When shipments no longer require a license, prices will probably rise to the present export level. The increased demand from abroad may result in the taking on of extra hands in the Lancashire mines, where employment is already given to nearly 100,000 workers.

The proposed scheme of state electric-power stations, if carried out, should effect considerable economies in the use of coal for industrial purposes in the cotton and steel manufacturing areas of Lancashire, but such an eventuality is at present too remote to use as a calculable factor in the plans of coal owners. Besides, increased demand in other directions, due to the growth of population and similar causes, will offset a decrease in the quantity of coal used for steam-raising or gas-making purposes. Of more immediate concern to Lancashire and to the coal-mining industry of the United Kingdom in general are the findings of the Coal Commission as to nationalization and the proposals formulated by the Coal Controller as to mining finances, both of which will to a large extent determine not only the fate of the coal trade but the industrial future of the United Kingdom.

Coal Traffic in Spanish Ports

The ports of Vigo, Corunna and Ferrol in northwestern Spain are important depositories for coal supplied to the various steamships calling at these ports, states Consul Edward I. Nathan, Vigo, under date of Mar. 27, 1919. In prewar times this coal was principally imported from Wales and deposited either ashore or in floating hulks, of which there are three in Vigo. Such deposits can be made in bond, but this privilege is accorded only to Spanish concerns. Hence a British company which supplies coal at Spanish ports does so through a subsidiary Spanish corporation, and a similar course would have to be

adopted by American concerns seeking this trade.

Over 50,000 tons of Welsh coal were imported at Vigo in 1913. Of this amount 37,770 tons were imported by two firms alone. About 8000 tons of briquet coal were also imported in 1913. Coal continued to be imported at Vigo during the years 1914 to 1916 in greatly reduced quantities. None was imported in 1917 and 1918, but with the renewal of foreign steamship service such imports are being resumed.

Spanish coal of inferior quality from the mines in Asturias is used locally by the railroads, gas works and for coasting steamers. In 1913, 16,318 tons of this coal were brought to Vigo by steamers and in 1918 10,780 tons were brought. A small quantity also comes by railroad. Spanish coal now sells at 180 pesetas (the normal value of the peseta is \$0.193), or \$34.75 per metric ton. Welsh coal has recently been sold as high as \$40.50 per ton.

Vice Consul W. Bruce Wallace, at Corunna, reports as follows: Coal has for a number of years been one of the most important items of import at Corunna, averaging 14,000 metric tons until 1913, when the imports increased to 35,234 metric tons, and to 58,426 in 1914. The imports were all from Great Britain and were principally Welsh steam coal for bunkering, although there were also important sales to the Spanish railroads. The imports decreased on account of the war and were only 6700 metric tons in 1916 and 1460 tons in 1917. Imports of Welsh coal at the neighboring port of Ferrol amounted to 7075 metric tons in 1913.

In prewar times Welsh coal could be imported at Corunna c. i. f. at \$4.83 per long ton, but this price increased enormously during the war, and although prices have decreased since the armistice a good quality of Welsh coal costs \$33.78 per long ton c. i. f. Corunna at the present time. The average freights were \$1.06 per long ton before the war, but are at present \$15.05 per long ton. It has hitherto been impossible to import American coal owing to the high cost of the freight.

A list of importers of coal in northwestern Spain can be obtained from the Bureau of Foreign and Domestic Commerce or its district or cooperative offices by referring to file No. 116007.]

Imports of Coal Into Denmark

According to an excerpt from *Finanstidende*, Copenhagen, Mar. 5, 1919, transmitted by Commercial Attaché Erwin W. Thompson, the armistice gave Denmark hopes of larger imports. With regard to coal, however, the development has been different, because of the difficulties due to the revolution in Germany and the English mining strikes. The combined import of coal, coke, cinders and briquets to Denmark was as follows: In 1913, 3,573,000 metric tons; 1914, 3,612,000 tons; 1915, 3,890,000 tons; 1916, 3,704,000 tons; 1917, 2,165,468 tons; and in 1918, 2,242,124 tons.

From the summer of 1917 until the armistice was declared the coal imports were about 200,000 tons per month, whereas the average in 1913 was nearer 300,000 tons. On account of the German revolution, however, this was reduced to about half during the last two months of 1918. In January the imports were about 160,000 tons, 40,000 tons of which were German coal, by special agreement; but at present the imports from Germany may be considered as practically stopped, except for 16,000 tons of gas coke per month. At the same time the imports

Hampton Roads Coal Exports

		NORFOLK		Cargo	Bunkers
Lamberts Point					
May 19	Nor. S.S. Imperator.....	Tela, Honduras.....	1,072	214	
May 21	Ital. S.S. Crema.....	Gibraltar FO (Italy).....	6,534	704	
May 21	Amer. S.S. Ulysses.....	Cristobal, C. Z.....	12,083	1,130	
May 22	Amer. S.S. Callooh.....	Havana, Cuba.....	2,733	517	
May 23	Ital. S.S. Battinini Accame.....	Gibraltar FO (Italy).....	5,726	782	
May 24	Ital. S.S. Luigino Accame.....	Gibraltar FO (Italy).....	4,039	465	
May 24	Amer. S.S. Lake Agomak.....	Bridgetown, Barbados.....	3,020	511	
Sewalls Point					
May 19	Amer. S.S. Lake Charles.....	Havana, Cuba.....	2,369	242	
May 22	Amer. S.S. Lake Lida.....	Kingston, Jamaica.....	2,491	243	
May 22	Amer. S.S. Dancy.....	Arica, Chile.....	2,400	585	
May 22	Amer. S.S. Lake Janet.....	Sagua la Grande, Cuba.....	1,822	353	
May 24	Amer. S.S. Lake Fondulac.....	Havana, Cuba.....	3,285	286	
Newport News					
May 17	Amer. S.S. Serpentine.....	Puerto Plata, S. D.....	987	341	
May 22	Amer. S.S. Garfield.....	La Plata, A. R.....	2,335	1,005	
May 22	Amer. S.S. Lewis Luckenbach.....	Rio de Janeiro, Brasil.....	12,032	
May 22	Am. Sch. Jacob W. Hook.....	Guayanilla Bay, P. R.....	911	

COAL AND COKE NEWS

Harrisburg, Penn.

On May 28 the administration compensation bill was re-reported to the Senate judiciary special committee practically as drawn by Attorney General Schaeffer. The committee has not accepted any of the amendments demanded in the measure by Joseph Grundy. Any amendments that are made in the bill will follow hearings on the house side of the Legislature. No changes are now contemplated except such as are calculated to strengthen sections that may not be clear as to their intent. The general principle of an increase in the basis of compensation from 50 to 60 per cent. of the weekly wage, with \$20 as the legal maximum and a minimum payment of \$6 a week will be adhered to.

The bill reorganizing the compensation board has been reported from committee. This bill raises salaries and makes the board a purely judicial body, all its administrative features being taken away.

The Senate passed the rehabilitation bill. The measure now goes to the House. The bill creates a department of rehabilitation in the department of labor and industry that will be charged with the duty of providing for the rehabilitation of workers injured in the industries and coal mines as well as for the rehabilitation of congenital cripples.

On May 28, a committee of senators was appointed to confer with anthracite coal operators in an effort to solve the mine cave question. Senator Max Leslie, of Pittsburgh, chairman of the sub-committee, states that he will endeavor to have the present voluntary agreement with the coal companies in the Scranton region greatly broadened.

For nearly the entire session Senator Davis, of Lackawanna, has been fighting to have his two bills reported out of committee with an affirmative recommendation. Some members favor reporting out the second bill of the Senate or calling for the appointment of a Pennsylvania Anthracite Mine Cave Commission.

With the exception of Senator Davis, the members of the committee were against reporting out the first Davis bill, all expressing the opinion that it would not remedy conditions and to put a man in jail would not repair damaged property, etc.

Charleston, W. Va.

Developments during the week ended May 24 in the West Virginia coal fields demonstrated that coal was in far greater demand and that it was only a question of time until it would be difficult to secure all the fuel needed in various markets. While production had not reached its limit yet the average output of the state was from 66½ to 75 per cent., and in some instances was even higher. In every market to which West Virginia coal goes there was a lively demand. That applied to tidewater, to general eastern and western markets, and to the Lakes in particular. The volume of lake business up until the latter part of May had been steadily growing.

Market conditions have improved to such an extent and the demand for coal is such that a number of West Virginia producers have disposed of their entire output for some time to come. That is particularly true as to the producers of smokeless coal in the New River and Pocahontas regions. Many of them no longer have any coal to sell. Their output is sold. These smokeless coals are now quoted at \$3 a ton.

Regions producing these coals are rapidly reaching full production. Though not yet operating on a full time basis, preparations are being made to work up to full time capacity as soon as labor conditions improve. Scarcity of cars may also prevent getting capacity product to market.

The trend of development in the Pocahontas district may be seen in a rapid reduction in the no-market losses from 88,000 to 64,000 tons—a gain of 24,000 tons. A total of 25,000 tons has been cut off the total production losses, which were reduced from 114,000 to 88,000 tons; production mounted from 285,000 to 289,000 tons. Pro-

duction is now approximately 66½ of capacity. The labor shortage is gradually entailing heavier losses, now being 18,000 tons—an increase of 2000 tons. There was also a 100 per cent. increase in the car shortage loss.

While the market for coal is much improved there is little or no demand for coke, the production being only a little over 8000 tons. Prices are firm, with run-of-mine smokeless quoted at about \$3 a ton.

Production in the Kanawha region has been further stimulated by more numerous orders from the Lake areas, though at the same time there is a large tonnage movement to general western markets. Some Kanawha producers are sold up to capacity for some time to come, though not all mines in the district are in operation; mines working operate from four to six days a week. On May 27 production was twice as large as it was on May 1. The output of the district as a whole has now reached about 70 per cent. of normal. Prices are stiffening quite materially.

Conditions in the Logan district were featured chiefly by a car shortage entailing a loss of 56,000 tons; the total production loss jumped from 127,000 to 175,000 tons. The output dropped from 176,000 to 164,000 tons, a loss of about 10 per cent. Last year's production during the same weekly period was 214,000 tons. Figures show a larger demand for Logan coal, no markets costing a loss of only 28 per cent. of full time capacity.

Fairmont, W. Va.

There continues to be a growth in the tonnage of coal mined from northern West Virginia coal fields in response to a much increased demand from all quarters, the total number of cars loaded during the week ended May 24 being in the neighborhood of 4600. Should loadings continue at the same rate until the end of the month, it will mean a total of about 18,000 cars for the month, or 4000 and perhaps 5000 cars more than for April; so it is safe to estimate a production of about 66½ per cent. in the northern West Virginia fields. As a result of such conditions idle mines are dwindling in number. Mines heretofore idle are not only now supplying the Lake trade but the export trade as well, and other western consuming areas are also absorbing more coals. However, Lake shipments are exceeding shipments to Chicago and other general western markets. So far the proportion of eastbound is much larger than westbound coal, shipments of railroad fuel swelling the volume of eastern shipments. Some of this coal, however, has been sold at extremely low prices. That a car shortage is impending is the belief of many shippers in northern West Virginia, although few if any operations have so far failed to receive an adequate supply. But only about half as many cars are coming into the district as was heretofore the case.

Louisville, Ky.

Louisville and western Kentucky coal operators, after a long and hard fight, have finally secured justice in connection with discriminatory rates on western Kentucky coals which made it impossible to compete in markets north of the Ohio River and also in Mississippi Valley and southwestern markets. The Ohio Valley Coal Operators' Association has been fighting the rate issue for many months. On May 21 this association secured the order of the Interstate Commerce Commission which directed the railroads to make marked reductions in rates on coal from the district (effective Sept. 1, 1919) to the Mississippi Valley, southwestern territory, Illinois and various northern and western states. The association assailed certain rates as being unjust, naming the Illinois Central and nearly a hundred other lines as instances. The commission held that many of the rates were unduly prejudicial as compared with rates to competing points, although not unduly high.

This will enable the western Kentucky

operators to enter the general markets with a much better chance of securing profitable business. Due to the low prices on western Kentucky coals and unreasonable freight rates, it has been impossible to mine coal profitably and market it in many sections, especially north of the Ohio and in the far South. The result has been that western Kentucky operations, except where deliveries have been made by barge, have been held to a rather small field.

Alberta, Canada

Some minor changes were made in the Mines Act of the Province of Alberta at the session which recently came to a close. One amendment provides that the provisions of Section 29 of the act shall not apply to mines where coal is mined by removing all the overlying strata. This section also deals with the management of a mine, making it obligatory that its operations shall be under the "control and supervision" of a certificated manager; laying down rules and regulations to enforce the keeping of underground workings in such condition as will safeguard workmen. Another alteration provides for the semi-monthly payment of wages in coal mines as follows: "Wages earned from the 1st to the 15th day of each month shall be paid on the first Saturday after the 26th day of the same month, and all wages earned from the 16th day to the end of the month shall be paid on the first Saturday after the twelfth day of the following month; provided that if any of the Saturdays in question is a holiday the wages shall be paid on the Friday before." The power given an employer to retain money due for doctor's fees has been repealed. Safety lamps shall be inspected by a person holding a first, second or third class certificate. The two persons appointed by workmen to inspect a mine shall be practical miners.

PENNSYLVANIA

Anthracite

Lansford—The Hauto washery of the Lehigh Coal and Navigation Co., after being idle since the middle of February, resumed operations recently.

Pittston—The Kingston Coal Co., the Conlon Coal Co., the Haddock Mining Co., and the Lehigh & Wilkes-Barre Coal Co. are included in a list of Wyoming Valley employers who have made definite public announcement that former employees who went to war will be reinstated in their old jobs as fast as they return to claim them.

Scranton—The total production of anthracite by the Delaware & Hudson company in 1918 was 9,059,228 tons (long), an increase of 415,505 tons or 4.8 per cent. over 1917 shipments. The year's output was 11.8 per cent. of the total production of the anthracite mines and washeries. The number of breaker hours required for the company's production was 55,191.

Auburn—The South Mountain Coal Co., a new enterprise, has opened a washery at this place in Schuylkill County, where coal will be reclaimed from the Schuylkill River. The plant will have a daily capacity of about 600 tons and the output will be chiefly steam sizes. Capital was supplied by Hazleton and Philadelphia interests.

There are approximately 30 washeries, active and idle, on the Schuylkill River between Pottsville and Port Clinton, and a Pottsville authority says that there is about 50,000 tons of steam coal, for which there is a dull market at present, now stored at these plants.

Pottsville—Deeds recorded at the court house at this place recently show that a total of 3967 acres of anthracite coal lands changed hands. Four of the deeds recorded are from the Schuylkill Coal and Iron Co. to the Hudson Coal Co. The deeds in question include: A tract of 870 acres of land in Norwegian Township; 251 acres in Pottsville and Norwegian Township; 100 acres in Tremont and Tremont Township and 898 acres in Branch Township. Two other deeds recorded show transfer of coal lands to the Hudson Coal Co. as follows: One deed gives title to 529 acres Tremont

and Reilly townships; another deed transfers 1319 acres in Blythe and Schuylkill townships. A consideration of \$10 was recorded in each case.

Bituminous

Latrobe—On the night of May 19 the barn of the Ridge Coal Co. near this place, burned to the ground. The barn was a 40 x 60 ft. structure. The loss is covered by insurance.

Washington—The Pittsburgh Coal Co. has purchased two tracts of coal land from William F. Ellwood, Susan E. Mounts and Agnes E. Brownlee, all of Washington, and E. E. Morris, of Waynesburg. One tract in Amwell Township contains 15.8 acres, and the other in Canton Township contains 108 acres. The price paid per acre was \$300.

Waynesburg—An important sale of Greene County coal land took place here on May 13. Sheriff J. E. Adamson sold an undivided one-seventh interest owned by James R. Barnes, of Uniontown, in 126 tracts of coal in Center, Franklin, Washington and Morris townships. The interest aggregated 1500 acres. John W. Donnan, of Washington, Penn., was the purchaser of this interest for the sum of \$252,000, or \$168 an acre.

Pittsburgh—The Bureau of Mines has charge of the making of the moving picture of the coal industry recently authorized by the National Coal Association's board of directors. It is the desire of the bureau and of the association to receive any suggestions which members may care to make. Actual filming of the scenes probably will be begun late in June or early in July. It is intended to present the subject in some detail at meetings to be held in June in Pittsburgh, Chicago, Kansas City and Birmingham. The dates of the meetings are yet to be announced.

Uniontown—A tract of coal land in Springhill Township, Fayette County, appraised at \$225,000 brought \$40,000 at a Sheriff's sale recently. The tract of 311 acres was bought in by attorney Luke H. Frasher.

Directors of the Taylor Coal and Coke Co. held their annual meeting here recently. C. P. Bolton, of Cleveland, Ohio, resigned from the board of directors because of ill health. The following officers were elected: F. K. Moore, president; D. B. Stauff, secretary and general manager; F. H. Ulmar, treasurer; F. K. Moore, I. H. Elliott, H. A. Fuller, all of Cleveland and M. H. Bowman, of Uniontown, directors.

WEST VIRGINIA

Hartland—An expansion of operations having been decided upon by the Fellabaum Coal Co., it is not only arranging for further openings near this place but it is also building additional side-track to reach these mines.

Sterrett—The Main Island Creek Coal Co. shortly expects to be able to increase its coal production to the extent of 6000 tons a day, through the operation of the six new mines at this place. It is stated that shipments from all the plants of this company will soon aggregate 200 railroad cars a day, under normal conditions, when all the mines are in operation.

Beckley—Many improvements will be made at the various plants of the New River Coal Co., operating in Fayette and Raleigh counties, W. Va., during the summer, all with a view to securing a larger output. The company will probably build new tipples at Summerlee, Whipple and Lochgelly. The present capacity of the company's mines is about 12,000 tons a day.

Norton—The new Y. M. C. A. building erected by the West Virginia Coal and Coke Co. at this place was formally opened recently. General Manager E. Drennen made the presentation speech in turning the building over to the community, which is largely made up of employees of the company. The "Y" building and equipment cost \$20,000, and is an expression of the company's interest in its employees. Charles D. Norton, of New York, the first vice-president of the company, was present.

Rainelle—The Chesapeake & Ohio Ry. has granted main line rates on coal to the Sewell Valley railroad coal operators.

The Sewell Valley line taps the holdings of The Meadow River Coal and Land Co., of Rainelle, Greenbrier County, W. Va., and the Gauley Coal Land Co., of Boston; these companies control about 200,000 acres of smokeless coal. Various analyses show it to run 73 to 75 per cent. fixed carbon and only 0.60 to 0.68 sulphur.

The Sewell Valley line connects north and west with the Kanawha & Michigan and

the Coal and Coke railroad and to the northeastward with the Baltimore & Ohio.

Charleston—A new company which lately has begun to operate in the Coal River field is the Bradley Mining Co., having recently finished construction work on its plant.

Within a short time the Malleable Coal Co., of which Samuel Butler of Charleston is general manager, will construct about two miles of railroad to connect the company's plant with the Coal River branch of the Chesapeake & Ohio railroad.

Carter Brothers, of this place, are making progress in the construction of a mining plant at Shrewsbury, where coal will be mined from the Cedar Grove seam. This firm counts on beginning the shipment of coal within a short time.

OHIO

Columbus—The state of Ohio has under consideration the purchase of 7000 acres of coal land in Vinton County. The land is to be sold shortly at public auction.

The state is spending \$600,000 a year for coal, of which \$60,000 is for freight. If the mining were done by penitentiary labor, it is stated, most of the fuel expense could be saved, excepting the freight item, and it would be reduced. The land is said to be underlaid with an eight-foot seam of coal. Excellent shipping facilities would be provided by the Hocking Valley and the Baltimore & Ohio Southwestern.

Pomeroy—After a suspension of work for many months, all the Ebersbach mines—the Rolling Mill, Charter Oak, Forest Run, Dark Hollow and the big new mine at Syracuse—resumed operations May 13. It is expected that work will continue uninterrupted during the rest of the year. The coal to be mined is for the Lake trade.

INDIANA

Evansville—With the clearing away of the tipples, the old Ingle coal mine is a thing of the past. It was the first mine to be opened in Indiana and was owned by an English syndicate. When the shaft was sunk it was called the Bodiam mine, and eventually the workings extended under the Ohio River to the Kentucky shore. The last owner of this property was J. H. Moore, the proprietor of the Crescent coal mine in Evansville.

Indianapolis—Many companies, located in southern Indiana, have filed suit in the Federal Court here, naming the Indiana Industrial Board and its members as defendants, and asking that an injunction be granted restraining the board from enforcing the amended compensation act, and elimination of Section 18, which is held to be invalid and unconstitutional, in that it compels acceptance by the coal industry and exempts other industries in similarly hazardous occupations.

ILLINOIS

Chicago—The O'Gara Coal Co., which went into bankruptcy in 1912, with liabilities of almost \$5,000,000, has been declared solvent by Federal Judge Carpenter. It was announced that the company would settle every claim against it except the one of Thomas J. O'Gara, former president, for \$1,500,000.

Du Quoin—An organization has been perfected in this city under the name of the Du Quoin Correspondence Mining School with D. T. Fox, of Du Quoin, and John Kincannon, of St. Johns, as directors. Through this institution, miners will be given a chance to study at night and the following courses are offered: Mine manager, 1st and 2nd class; hoisting engineer, 1st and 2nd class; mine examiner; firing; instructions in electricity and other underground work.

KENTUCKY

Louisville—The directors of the Liberty Coal and Coke Co., at a meeting in this place named S. T. Ballard, president; M. S. Barker, vice-president; K. T. Cornelius, secretary-treasurer and William N. Ewald, general manager. The company operates large mines in Bell County on the Straight Creek seam.

Russell—The large number of cars passing through the yards of the Chesapeake & Ohio, at this place, is a general index to improved conditions in West Virginia and northeast Kentucky, the daily number of cars having reached an average of about 1700. Western coal from the states mentioned is weighed at Russell and much of the coal is billed from here.

The large Solvay byproduct plant in northeast Kentucky, near Huntington, un-

der the management of A. B. Rawn, started during the week ended May 24 on a full time basis, only seven ovens having been in operation for a time.

Williamsburg—The Southern Coal and Coke Co. and its associate companies, has now reached a daily production of 10,000 tons of coal. This company has acquired and developed additional operations in the Harlan, Ky., field and new operations in the Hazard, Ky., field. Other operations of the company are in the old Jellico field near the Kentucky-Tennessee line and the Careyville field of Tennessee. All of these operations have Louisville & Nashville railroad outlets north and south, except the Hazard field, which ships only north. The Careyville operations serve only the southern trade over the Southern Railway.

ALABAMA

Birmingham—It is reported that 15 miners, employees of the Majestic Coal Mining Co., near this place, are believed to be dead as a result of the recent disaster; 14 employees have been rescued badly burned.

Montgomery—Alabama owns a large acreage of land rich in coal. The state Legislature committee on convicts and roads pronounces the system of leasing convicts to corporations intolerable. The question has come up as to whether the state shall enter the mining field as a competing corporation. The final report of this committee on the coal mining question is awaited with interest by people throughout the state. There are over 1200 convicts in Alabama capable of doing work in the mines; many are so employed now and have become expert by years of experience.

MISSOURI

St. Louis—The Western Coal and Mining Co. and the Weir Coal Co., of both of which W. P. Hawkins is president, are sinking three new mines, one north of Franklin, one near Carona, Kan., and one at Woodrow, Mo. The tracklaying and preliminary work have been completed at each of the new operations.

IOWA

Des Moines—Production statistics of Iowa for the year 1918 just compiled by the state mine inspector's office show that in spite of the agitation for increased output and the storing of coal during the summer months, there was a smaller output in 1918 than in the year preceding. The tonnage of 1918 for Iowa was 8,219,138, as compared with 9,049,806 in 1917 and 7,217,979 in 1916. Lack of help, the zoning system and the refusal of the railroads to contract for coal during the spring months of the year because of a disagreement over price are said to be the principal causes for the smaller production of 1918 as compared with the previous year. The average number of employees in and around the Iowa mines was 14,563, as against 15,464 in 1917 and 15,195 in 1916. The average number of days worked in Iowa in 1918 was 207; in 1917, 240 days, and in 1916 212 days. There were 52 mining machines in operation in 1916 and 76 in 1918.

WISCONSIN

Postol—The surface plant of the Wilson mine at this place has been destroyed by fire. The mine has not been worked for about a year and the origin of the fire is a mystery. The burned structure cost over \$20,000 and was owned principally by Platteville interests.

Edwardsville—Work has been started south of this place on a large plant which is expected to begin shipping coal in the fall. The main shaft will be 12 by 16 ft. in dimension. The company developing the property controls some 18,000 acres of coal and recently announced its intention to spend \$500,000 in constructing a modern mine with every appliance for mining coal successfully.

OKLAHOMA

Fort Smith—Covington and Grant of this place, general counsel for the United Mine Workers of America, has notified miners on the Choctaw and Cherokee Indian coal lands in Oklahoma, to stop paying rental to the land purchasers. This action followed the withholding of confirmation of sale of such lands by the Department of the Interior. Transactions to the extent of \$300,000 in Indian lands underlaid by coal are involved. Counsel for the miners interceded for the home owners in Washington, D. C.

Muskogee—President John Wilkinson, of District No. 21 of the United Mine Workers of America, states that any effort made in Oklahoma and Arkansas

to repeal the Workmen's Compensation Act will be opposed. The act as amended by the last Oklahoma legislature increased the compensation allowed coal miners, in case of disability, from 50 to 60 per cent. of the normal wages of the injured man. Coal operators and other employers are making a fight for a repeal of this provision.

MICHIGAN

St. Marys Falls Canal—During the month of April, 1919, there passed west-bound through the United States Canal 415,824 net tons of bituminous coal and 142,864 net tons of anthracite. The U. S. canal opened Apr. 10, the Canadian canal opening two days later.

Foreign News

Vancouver, B. C.—The Provincial Department of Mines has voted a sum of \$50,000 to aid in the development of coal, petroleum and natural gas, lying under crown lands near the Alberta boundary.

Brussels, Belgium—The International Parliamentary Commercial Conference adopted a resolution inviting the allied and associated governments to appoint an international committee. The object of this committee is to centralize information relating to the production, transportation and consumption of fuel, with the idea of bringing about thrift in its use.

Toronto, Ont.—The annual meeting of the Crows Nest Pass Coal Co. was held on May 20. The financial statement showed profits of \$216,984, as compared with \$57,635 for the previous year. The coal mined in 1918 amounted to 681,942 tons, and the coke produced to 183,771 tons, as against 504,768 tons of coal and 146,533 tons of coke in 1917. Dividends paid during the year amounted to \$279,499, and the total credit balance was \$318,497. General Manager W. R. Wilson was added to the directorate as second vice-president.

Nanaimo, B. C.—Water is being pumped from the workings of the Squash mine of the Pacific Coast Collieries Co., which is situated some distance north of this place on the east coast of Vancouver Island. This mine was closed when the war broke out in 1914 and since then has been practically deserted. It is understood to be the company's intention to put the mine on a producing basis at the earliest possible moment.

Personals

R. W. McFadden has been appointed purchasing agent for the Buck Run Coal Co., and also the Darkwater Coal Co., with headquarters at Buck Run, Penn.

Charles A. Greene, the Chicago representative of the Borden Co., manufacturer of Beaver pipe tools, has opened a downtown office at 549 West Washington Boulevard, Chicago, Ill.

D. L. Caulten, for the past six years assistant superintendent for Berwind White Coal Mining Co., has resigned to accept a position as mine inspector for the Fleming division of the Elkhorn Coal Corporation.

A. C. Watts, the chief engineer of the Utah Fuel Co., of Salt Lake City, Utah, has also assumed the duties of geologist of this company. The office of geologist of the company, formerly occupied by C. H. Gibbs, deceased, has been consolidated with the office of chief engineer.

H. C. Hawes is the new president-manager of the Wells-Elkhorn Coal Co. in charge of the Black Diamond and Salt Lick operations of the company. He was manager of the Salt Lick Coal Co. and succeeds W. C. Hawes, formerly manager of the Black Diamond Coal Company.

Colonel G. A. Burrell, president of the Island Refining Co., 62 Cedar St., New York City, has been awarded the degree of Doctor of Science, by Wesleyan University, Middletown, Conn. Colonel Burrell had charge of gas investigations for the Bureau of Mines for a number of years and from the time this country entered the war he was connected with war work in this and allied lines.

E. C. Mahan was recently made president of the Southern Coal and Coke Co. at its annual meeting, held in Williamsburg, Ky. Mr. Mahan succeeds the late Dr. A. Gatliff, former head of the company. The general offices of this company are at Knoxville, Tenn. T. B. Mahan remains as vice president of the Southern company. N. B. Perkins, of Williamsburg, Ky., was made secretary-treasurer, and N. L. Mahan, of Knoxville, general manager.

C. D. Boyd, formerly with the Louisville & Nashville R.R., as coal traffic manager, has opened offices at 1116 Starks Building Louisville, Ky., for handling traffic matters for the Southern Appalachian Coal Operators' Association, Harlan Coal Operators' Exchange, and Hazard Coal Operators' Exchange. Mr. Boyd is handling general traffic matters, and has recently gotten out a 19-page bulletin to all members relative to traffic matters and movements in April.

Obituary

Thomas Monahan, manager of the Monahan Coal Co., died at his home in Butte, Mont., on May 13. He was 39 years of age.

H. L. Hubbard, superintendent of the Superior Pocahontas Coal Co., of Davy, W. Va., died on May 17. He was 38 years of age.

John P. Reese, vice-president and general manager of the Chicago & Northwestern coal properties for the past 12 years, died Tuesday, May 27, at his home, 5614 Waterman Ave., St. Louis, Mo., after an illness of several months from a complication of diseases. He is survived by his wife and two children, Ruth and Kenneth. His body was shipped to his former home at Albia, Iowa, for interment.

Industrial News

Prestonburg, Ky.—To meet the increasing demand for its coal on the Lakes, the Middle Creek Coal Co. will add new picking tables and much new loading equipment to its plant at this place.

Bluefield, W. Va.—Sales headquarters of the Pocahontas Sales Co. and of the Glen Alum Fuel Co. have been established in the Fischer Building, Chicago, Ill., with John R. Miller as office manager.

Punxsutawney, Penn.—The Pansy Coal Co., located near Valier, Penn., has completed negotiations for the leasing of about 450 acres of coal, in the vicinity of this place, from the Berwind-White company.

Charleston, W. Va.—The New River Coal Co., operating in Fayette and Raleigh counties, is understood to be having plans prepared for extensive improvements at its various plants to increase the present capacity.

Bluefield, W. Va.—A new tippie costing \$15,000 has recently been completed by the Dry Fork Colliery Co. at Yukon, McDowell County, W. Va. The tippie has a capacity of 1000 tons of coal per day. The general office of this company is at Bluefield.

Wellston, Ohio—The Wellston Hill Coal Co., of this city, Homer Goddard, president, and Earl Littler, secretary, has purchased the holdings of the Coalton Fuel Co., in Washington Township, near here, and will mine the No. 2 coal on the property. The tract contains 440 acres.

Terre Haute—The Government mine rescue car which will be permanently stationed at this place was sent to Washington, D. C., for inspection by Secretary of Interior Lane and other officials interested in rescue work. The car is most complete and up-to-date.

Widen, W. Va.—Plans are in process of formation by T. E. B. Siler, Charleston, W. Va., and associates for the development of a total of about 1136 acres of coal located in Nicholas County, W. Va. Robert L. Porter, Charleston, and Matthew Slush, Detroit, Mich., are also interested in the project.

Johnstown, Penn.—The Cambria Steel Co. is said to be considering plans for the opening of a new mine in the Rosedale district. The company recently started operations in two other mines, and within the past year a colony of approximately 500 employees has been established in the vicinity of these plants.

Birmingham, Ala.—The Macomber & Whyte Rope Co., manufacturer of wire rope and wire, at Kenosha, Wis., announces the opening of a branch office at this place under the direction of James A. Boope, southern manager, 805 American Trust Bank Building. This company's business is reported to have increased rapidly during the past few years in the South.

Charleston, W. Va.—A power house is to be added to the plant of the Kanaelk Coal Co., near Clendenin. The same company will construct more houses and will also install additional side track.

Pittsburgh, Penn.—Now that the United Coal Corporation has become the Hillman Coal and Coke Co., and the management consolidated with other Hillman companies, it is stated that the personnel of the combined management will be: William L. Affelder, general manager of the Hecla Coal and Coke Co. and the Thompson Connellsville Coke Co., general manager; Harris T. Booker, general superintendent of the United Coal Corporation, general superintendent; and J. Dickerson Martin, chief engineer of the United Coal Corporation, chief engineer.

Frankfort, Ky.—Under a decision of the Franklin Circuit Court, of this place, the Federal Coal Co., is entitled to recover \$2,700 mortgage tax paid for recording a mortgage on eastern Kentucky coal property. The company purchased the tract and mortgaged it, the tax amounting to the sum sued for. Afterward the company lost its title to the land in a suit in a Federal court and a commissioner was appointed to cancel all encumbrances. The company demanded a return of the mortgage tax, contending that under the conditions the instrument filed was not a real estate mortgage.

Milwaukee, Wis.—The Nordberg Manufacturing Co. is manufacturing a new type of Uniflow poppet valve engine. It is known as the Nordberg-Todd and is built in sizes ranging from 200 to 2000 hp. for any available steam pressure, any available superheat, any available vacuum and any available back pressure. The assertion is made that under any of these conditions the engine will operate with lower steam consumption per horsepower, over wider variations of load, than any steam prime mover thus far developed. The engine can be changed from condensing to non-condensing operation, or the reverse, while running.

Huntington, W. Va.—The Main Island Creek Coal Co. will hereafter have its Western sales office at Indianapolis only instead of at Richmond, Ind., and at Chicago, Ill. The offices at both these latter points have been discontinued, according to an announcement made by D. J. Payne, of this city, general sales agent of the company. A new concern which has just entered the producing field is the Brush Creek Coal Co. Its plant has been completed and is now operating, dumping over three tipples. The company, however, proposes to use three additional tipples and has started construction work on such structures. H. C. Jones, of Logan, is president of the new company and James Gent is superintendent. The plant of the company is at Costa, on Coal River.

Du Quoin, Ill.—The Hamilton Coal & Mining Co., of Weir, Kansas, is now completing plans for the opening of a large strip mine northeast of this city, on a tract of land which was recently acquired by it. This will make the second large strip mine to be opened up in the last year within the city limits of Du Quoin. The other strip mine is owned and operated by the E. J. Scott Coal Co., a St. Louis company; at the present time this strip mine has a capacity of 600 tons. The company has sufficient acreage to enable it to operate this mine for five years or more.

Stripping is fast becoming a popular method of coal mining among Southern Illinois operators. Every acre of coal land suitable for stripping is being leased and at the present time there are many tracts near Du Quoin which are under option.

Crooksville, Ohio—The Sunday Creek Coal Co. has taken over all the properties of the Sunday Creek Coal Co. of New Jersey, the Buckeye Coal and Railway Co., and the Ohio Land and Railway Co. By this transaction the Sunday Creek becomes the owner of the larger part of the holdings of the Buckeye Coal and Railway Co., of southeastern Ohio. The holdings of the Buckeye Coal Co. consist of two mines, several hundred houses, a large store, a hospital and theater at San Toy. This is one of the valuable mine properties of Ohio. New tipples, shaker screens and loading booms are being installed by the company in the Sunday Creek Valley mines, which include Corning, Hemlock, Buckingham, Congo and Shawnee. The Tropic Mining Co. has purchased the holdings of the Sunday Creek Co., at Rose Farm, the purchase including all surface, company houses and other property of the Sunday Creek Co. in that section. It is stated that the Tropic company soon will begin development work on its newly purchased territory.

MARKET DEPARTMENT

EDITED BY ALEX MOSS

Weekly Review

Soft Coal Market Generally Inactive, Although There Is Some Improvement—More Buyers Coming Into Market—Operators Not Eager to Sign Long-Time Contracts—Anthracite Industry Active, Though Not on Steam Coals

SPEAKING broadly, the soft-coal market is inactive, although there is a slight improvement evident all along the line. Coal for prompt shipment can be bought at prices lower than those quoted on contract business, making it clear that operators are taking into account the uncertainties that may surround them later on in the year. In more than one instance operators have refused to bid on contracts, preferring to take the market as they find it. Quotations for future shipments are likely to grow firmer from week to week. A few of the large consumers who had been out of the market for some time are now making purchases quietly at short intervals, but the volume of this kind of buying is small and seems to exert no strengthening effect on the prices for spot coal. In fact, prices on coal for prompt shipment have been lower the past week or two than at any other time this season.

Operators are evidently expecting labor trouble in the near future, for they are insisting on labor clauses in all contracts. Consumers have already

begun to realize that it is becoming increasingly difficult to close for their future needs. Production of soft coal for the week ended May 24 totaled 8,719,000 net tons as against 11,569,000 net tons for the same period last year. Prices generally are being maintained, with indications pointing to an early advance in the better grades, such as Pocahontas and New River.

An encouraging note has been struck in the Middle West. About 75 per cent. of the steam trade in Michigan and Indiana has already been covered by contract, and if consumers in Illinois, Wisconsin and Minnesota follow suit it will enable the interior mines to work more regularly than they are now working. In the latter states probably less than 50 per cent. of the industries have contracted for their future coal supply.

There is no apparent let-up in the demand for the domestic sizes of anthracite, and retail dealers continue to be deluged with orders from consumers who are insistent upon prompt deliveries. Egg, stove and chestnut are the sizes in greatest request, while the

operators and dealers find that broken and pea coal are being disposed of with difficulty. The steam sizes of anthracite, on the other hand, are somewhat draggy, and extreme cuts in price have been made on the smaller sizes, particularly rice and barley, in order to stimulate buying. On June 1 all the producing companies increased their prices on the domestic sizes of anthracite 10 cents a ton, in accordance with their circular announcement of last March, when the spring prices were established. The output of hard coal for the week ended May 24 totaled only 1,679,000 net tons, which is approximately a decrease of 65,000 net tons compared with the week preceding. During the like period in 1918 the anthracite mines produced 2,005,000 net tons.

The movement of coal to the lake docks, for transshipment to the Northwest, is moderately active. The tonnage of coal available is not sufficient to load all the carriers that offer themselves. It has not been possible to attain a loading total of 1,000,000 tons a week thus far this season.

WEEKLY COAL PRODUCTION

The improvement in production of bituminous coal which was recorded during the past few weeks continued through the week ended May 24, when the output was estimated at 8,719,000 net tons. This tonnage, while considerably in excess of the production during the week ended May 17, estimated at 8,442,000 net tons, was far below the output of the week ended May 25, 1918, estimated at 11,569,000 net tons. The daily average per working day during the week ended May 24 is placed at 1,453,000 net tons as against 1,366,000 net tons for the calendar year to date, and 1,807,000 net tons, the daily average for the same period of last year.

The production of anthracite during the week ended May 24 is estimated at 1,679,000 net tons, a decrease of approximately 65,000 net tons, or 4 per cent., compared with the week preceding. The daily average during the current week is placed at 280,000 net tons, as compared with 246,000 net tons for the calendar year to date and 334,000 net tons, the daily average for the corresponding week of 1918. For the period Jan. 1 to May 24 the production is estimated at 30,538,000 net tons, and is far below that of last year, estimated at 39,149,000 net tons.

Bituminous coal dumpings at the lower lake ports during the week ended May 17 are estimated at 911,309 net tons, and exceed the tonnage dumped during the same week of last year by approximately 115,000 net tons, or 15 per cent. For the season to date the dumpings at the lower lake ports amount to 3,132,157 net tons as against 2,843,011 net tons during the corresponding period of last year.

The demand for coal is improving, the general average of time lost on account of

no market decreasing from 39.2 per cent. in the week ended May 10 to 36.4 per cent. in the week ended May 17. Excepting the Westmoreland, Fairmont, Virginia, Iowa and the fields in the western states, all districts recorded improvement in the demand for coal. In eastern Kentucky, two districts—Hazard and Harlan—report no market losses of less than one day a week and to exceed 80 per cent. operating time.

The production of beehive coke in the United States during the week ended May 24 is estimated at 249,828 net tons as against 210,657 net tons during the week preceding, and 620,090 net tons during the corresponding week of 1918. Improvement over the week preceding occurred in all the states, with Pennsylvania making the greatest gain. For the calendar year to date the production of beehive coke is placed at 8,215,277 net tons as against 11,964,490 net tons during the same period of last year.

BUSINESS OPINIONS

Marshall Field & Co.—Current wholesale distribution of dry goods is less than the extraordinary large volume of the corresponding week a year ago. More customers are in the market and all report a continuance of excellent retail business. Orders from road salesmen for both immediate and future delivery are greatly in excess of the corresponding week of 1918. Collections are excellent.

The Iron Age—Demand for steel has improved measurably and sentiment throughout the trade has turned for the better. The Railroad Administration has bought under protest the 200,000 tons of steel rails on which bids were taken May 17, paying \$47 for open-hearth rails, the price named by the Bethlehem, Lackawanna, Colorado,

Carnegie, Illinois and Tennessee companies. The Midvale bid was \$57 for open-hearth and \$55 for Bessemer rails. The Lackawanna and Bethlehem awards were 40,000 tons, while the Colorado mill received 20,000 tons and the three Steel Corporation subsidiaries 100,000 tons.

Dry Goods Economist—Highly encouraging as an index of demand for dry goods are the reports from agricultural sections, which are unanimous in pointing to continued wealth for the farmer. The labor situation in many textile centers is getting easier. The chief disturbance to production at present is the demand of silk weavers in Paterson, N. J., for shorter hours and higher wages. In one silk mill in Pennsylvania the operatives have struck with similar demands. In the strike of the operatives in New York garment factories there have been no important developments. Conferences between representatives of the union and of the manufacturers are held daily, but these have so far been without practical result.

Atlantic Seaboard

BOSTON

Widening differential between spot and contract business. Spot market reacts unfavorably under stress of present conditions. Undertone begins to change for the better. Fairmont grades still sluggish. Hampton Roads coals unchanged. Local capital shows interest in fuel oil. Anthracite demand continues.

Bituminous—The bids opened by the Navy Department on May 29 are the first

real indication of materially firmer prices on the steam grades for season delivery. It is clear that operators are now taking into account some of the uncertainties involved in contract undertakings for the next ten months, and quotations for shipments beyond the next 60 days are likely now to harden from week to week. In some instances shippers have declined to make prices for futures.

The spot market has been influenced both by the diffident buying that has prevailed from the opening of the season and by the prices at which so much locomotive fuel has been placed. The anxiety to keep mines in operation has also been a factor, but the result thus far has been without any material increase in output. So far as this territory is concerned, receipts show the same low average that has obtained since February and we have yet to see any marked increase in movement either all-rail or by water, although it is probable that the railroads from now on will make an effort to build up their reserve supplies. A few of the larger buyers who had kept aloof from the market are now making quiet purchases from month to month, or even from week to week, but the volume of coal arranged for in this way has been small rather than large and seems to have had no bracing effect on spot prices. In fact, on certain grades all-rail, spot figures have been lower the past fortnight than previously this season.

The undertone, however, is steadily changing. Some steam users have already begun to realize it is not so easy to get covered on desirable grades at the contract prices quoted 30 days ago, and while we are not yet in position to report any considerable advance in the f.o.b. mine basis, it is increasingly evident that operators are insisting upon labor clauses in all contracts.

The Fairmont district seems especially distinguished this year for low prices. The labor situation there has seemed more stable than in central Pennsylvania and there has been more effort to get spot business. At the same time this territory is always slow responding to high-volatile coals and aside from the railroads only a light tonnage has been placed. There are enough low volatiles of known quality to meet requirements thus far and it is the exception where coal of any but medium to high grade has been purchased. The through tariffs operate against coals emanating from the W. M. and the B. & O. in any case, and that is a further reason why West Virginia coals all-rail have had only a restricted market in New England.

Pocahontas and New River show no perceptible change. Prices offshore for deferred loading should soon show an upward trend, however, if the recent Navy proposals are any criterion. For the moment barge transportation is less easy to secure from the Southern ports and that, too, has caused a slight uneasiness on the part of those who continue to depend upon Hampton Roads sources. There are still selling efforts on the basis of \$2.35 per net ton f.o.b. mines or \$4.69 f.o.b. vessel, but apparently such offerings are more restricted than was the case a few weeks ago. Less is heard of market cargoes and on the whole there is more firmness to quotations for inland delivery. Export inquiry is being closely watched in the hope that better prospects will soon develop. At Hampton Roads the tenders to the Navy Department were in the aggregate considerably less than the requirements advertised and the trade here is interested to see what attitude the bureau officials will take.

A new development in oil is arousing some comment. The Massachusetts Gas Companies, of which the New England Fuel and Transportation Co. and the New England Coal and Coke Co. are subsidiaries, have organized an oil company to fabricate and distribute oil for fuel and other purposes.

Current quotations on bituminous at wholesale are about as follows:

	Clearfields	Cambrias and Somerset
F.o.b. mines, net tons....	\$2.15@2.75	\$2.75@3.35
F.o.b. Philadelphia, gross tons.....	4.27@4.95	4.95@5.50
F.o.b. New York, gross tons.....	4.62@5.29	5.29@5.85
Alongside Boston (water coal), gross tons.....	6.10@6.85	6.90@7.35
Georges Creek is quoted at \$3.20 per net ton f.o.b. mines.		

Pocahontas and New River are being quoted at \$4.69@5.14 per gross ton f.o.b. Norfolk and Newport News, Va. Alongside Boston the same grades are being offered at a range of from \$6.89@7.24, and on cars Boston and Providence at from \$7.60@7.90 per gross ton, the latter being the contract price f.o.b. cars for season delivery.

Anthracite—There is no slackening in the demand for domestic sizes. The pressure is steady both all-rail and by water to get household coal forward and the retail dealers continue to be swamped with orders from people who are insistent upon prompt deliveries. There are actual cases where small dealers have delivered during April and May a tonnage nearly 50 per cent. of what they received in the 12 months previous to Apr. 1, and instances are numerous where dealers have made deliveries of 20 to 25 per cent. of the year's business. Egg, stove and chestnut are the sizes in greatest demand, while broken and pea are little heard from. The steam sizes are draggy and radical cuts have been made in list prices, particularly on No. 3 or barley, in order to induce buying. Coastwise New England has not thus far had any greater quota than a year ago, and there is a great deal of anxiety over the outlook. If the city markets like Philadelphia and New York would ease up on their demand there would be more chance for New England. Distributors here are hoping there will be something of this kind during June.

NEW YORK

Anthracite market strong and demand steadily increasing. Production far behind and the industry faces a serious situation. Operators lack certified miners. Independent operators find good market and premiums are offered for their product. Anthracite steam sizes plentiful and prices are easy. Tidewater bituminous situation quiet. Coal moves slowly.

Anthracite—The market continues strong so far as the domestic sizes are involved, with the demand steadily increasing and dealers urging more frequent shipments. The trade is no doubt facing a severe winter, and the producers are urging early buying. Production is far behind and consumers who were slow in placing their orders are now beginning to realize that they might have to wait for their coal.

Conditions in the mining regions do not appear to be satisfactory for reducing the loss already existing in production so far this year. One reason for this, as pointed out last week, is the shortage of certified miners. This condition has existed for the past couple of years, while there is an abundance of help for the other jobs about the mines.

The mines are working steadily, but do what they will producers seem unable to catch up, even in a small way, with the heavy demand made upon them for the larger sizes of anthracite. Some operators claim to be sold ahead for several weeks for these sizes, while a few of the so-called independent operators have let it be known that they can receive no new orders at this time.

The asking of premiums for domestic coals by some of the so-called independent operators has been heard of, but the practice has not become general. These reports have it that as much as 30c. has been asked for some of the domestic sizes, but retail dealers so far have not been willing to pay anything above the regular company schedule, inasmuch as they have the greater part of the summer before them.

The second monthly advance of 10c. per ton for the domestic sizes, including pea coal, went into effect on June 1. It was said that some of the so-called independent producers were adding 20c. per ton instead of 10c., while others were adding 15c. per ton.

Demand continues strong for stove, egg and chestnut in the order named. There is also a good call for pea coal.

The anthracite steam sizes are proving a burden to the trade. Factory yards along the railroads are well stocked and some of the larger producers are taking advantage of the situation to store these coals. Prices are easy, buckwheat being quoted at as low as \$2.75 at the mines, rice 50c. lower and barley as low as \$1.50, much depending upon the quality of the coal. Some of the cheaper grades of barley are reported as being quoted at still lower prices.

The situation regarding the small sizes is becoming serious. Dealers are refusing to make room for the surplus and most manufacturers have taken all they can handle. Then again it is possible to obtain good grades of bituminous at less than it costs to procure the better grades of buckwheat, with the result that some manufacturers are seriously thinking of using bituminous coal altogether.

Dumpings of anthracite at the railroad piers for the week ended May 30 were 4366 cars as compared with 6036 cars the week previous, a decrease of 1670 cars.

Bituminous—It has been many months since conditions in the local bituminous

market have been anything like they now are. The situation is practically listless. Demand is slow and free coals are hard to move. Were it not for the quantity of coal shipped on contracts the local market would be "dead" and the piers under embargo. As it now stands, many shippers have been embargoed for a few days at a time.

Operators continue to hesitate before adding to their contract requirements. They are not willing to take on any more obligations although they would have no trouble to obtain their price. With labor as it now is, producers are not positive as to how production will be next winter. On the other hand, consumers who have held back for lower prices are now anxious to get under cover.

During the week ended May 29 the dumpings of bituminous at the various railroad docks were 5378 cars as compared with 5842 cars the week previous, a decrease of 464 cars.

Quotations on the various grades, mine price, for spot and contract delivery, range as follows:

	Spot	Contract
South Forks.....	\$2.90@3.25	\$2.95@3.50
Cambria County (good)	2.75@2.95	2.95@3.25
Clearfield County		
(good).....	2.50@2.75	2.80@2.95
Reynoldsville.....	2.50@2.75	2.75@2.95
Quemahoning.....	2.65@2.85	2.95@3.10
Somerset County (best)	2.50@2.75	2.95@3.10
Somerset County (poor)	2.00@2.35	2.50@2.75
Western Maryland....	2.25@2.50	2.50@2.75
Fairmont.....	2.00@2.25	2.35@2.50
Latrobe.....	2.10@2.25	2.25@2.40
Greensburg.....	2.25@2.35	2.35@2.60
Westmoreland 2-in....	2.60@2.75	2.60@2.75
Westmoreland run-of-mine.....	2.35@2.60	2.35@2.65

There is a good demand for anthracite from Canada, the trade, according to report, being offered 50c. above current quotations for quick shipments.

Current quotations, white ash, per gross ton at the mines, f.o.b. tidewater at the lower ports, are as follows:

	Mine	F.o.b. Tidewater
Broken.....	\$5.95	\$7.80
Egg.....	6.05	7.90
Stove.....	6.30	8.15
Chestnut.....	6.40	8.25
Pea.....	5.00	6.75
Buckwheat.....	3.40	5.15
Rice.....	2.75	4.50
Barley.....	2.25	4.00

PHILADELPHIA

Anthracite retail orders slacken with arrival of summer weather. Dealers differ as to outlook. Operators with short production in sight expect trouble. Retailers storing pea, egg, stove and nut continue in strong demand. Shippers loath to take new business. Pea coal sizing better latel. Steam coal unstable. June price schedule in effect. Many price rumors afloat. Bituminous dull. Rail fuel mostly covered. Better industrial buying.

Anthracite—With normal June weather prevailing there was a continuance of the slackening of interest on the part of consumers, which was quickly shown in the small number of new filling orders received by the retailers. As is usual when a sudden change in the weather affects buying, the dealers are quick to feel the change. As is often the case, also, we find they do not agree on the outlook of their business on the larger sizes of anthracite. Some argue that as there has been a very perceptible slowing up in the receipt of new business they fully expect to catch up with their deliveries by the end of June. They claim with dull business during July and August it will not be a difficult matter to stock their yards.

Those better posted dread the possibility of short supplies during the coming fall and winter. They know there is little of family sizes in storage, and that there is small possibility of the shippers filling their storage yards, because the demand is strong from all sections of the country. As a consequence there is small chance of there being a surplus.

It is just this condition which has strengthened the pea coal market. A number of the larger and also wiser buyers are slowly accumulating comfortable stocks of this size. Most dealers report their sales small, but many of them have ceased to wait for bargains and are buying slowly but regularly. The winter of 1916-17 convinced them the public will not do without fuel because they cannot obtain their favorite size, but will buy anything rather than do without.

The demand now for egg, stove and chestnut continues unabated, and today there is small tonnage in the yards, and it is nothing at all unusual to find yards without either stove or nut for short intervals.

No house is soliciting business on the family sizes, with the possible exception of pea. As noted above, this latter size has greatly strengthened and whereas some of the larger shippers a few weeks ago were running some of this coal into storage, the entire production is now being absorbed. The big companies are especially careful not to commit themselves to furnish coal to any dealers heretofore known as customers of the smaller operators, or to promise any more coal than furnished in other years. The fear of paying substantial premiums next winter is spreading and no doubt influences many in their efforts to make company connections. The representatives of the latter are very frank in explaining their prospective production does not warrant assuming new obligations.

As for the past six weeks, stove coal is by all odds in the strongest demand and in shortest supply here. Chestnut too is most active and many former buyers of pea coal have turned to it. The dealers account for this by the reason that when the price of pea was increased the size was reduced. Undoubtedly much coal came to market during the past two winters billed as pea coal that in reality was a small amount of pea mixed with large buckwheat.

Most operators have resumed their old standard of sizing and are now shipping a high class pea coal, which if continued will go far toward regaining the lost business. We have found some dealers willing to risk the guess that as the demand increases the size will again be reduced. Their judgment is based on their knowledge of the market being long on buckwheat. The call for egg remains unusual, and if this market has fallen off in its demand for pea it surely has increased on egg.

The steam coal market is quite unstable. The production of buckwheat is beyond the demand of the trade and quite a little tonnage is going into the storage yards. Rice and barley are particularly burdensome to the operators, and the storage yards are almost glutted with these sizes.

With the first of the month all of the companies increased their prices 10c. per ton on the family sizes in accordance with their circular announcement of last March, when the spring prices were established. Some of the smaller houses, following the plan adopted by them last month increased 15c. a ton, making them now 10c. higher than the company figures, and there are rumors of even greater increases.

The prices per gross ton f.o.b. cars at mines for line shipment and f.o.b. Port Richmond for tide are as follows:

Line	Tide	Line	Tide
Broken.....	\$5.95 \$7.80	Buckwheat.....	\$3.40 \$4.45
Egg.....	6.05 7.90	Rice.....	2.75 3.65
Stove.....	6.30 8.15	Boiler.....	2.50 3.50
Nut.....	6.40 8.25	Barley.....	2.25 3.15
Pea.....	5.00 6.60		

Bituminous—While some interests profess to see signs of improvement, others are extremely doubtful that any particular change for the better is in sight. It may be that the settlement of the railroad fuel problem has helped the general situation, but certainly the prices received for this coal are far from satisfactory and a good deal of the tonnage has been taken by concerns who have not heretofore participated in this business. The latest company to close was the Philadelphia & Reading, although prices have not yet been published on this business.

There is little spot trade; but some of the industrial plants are increasing their orders and it is just possible that business may pick up slowly during the summer. As a matter of fact many shippers feel that after the peace treaty is finally negotiated there will be something of a general resumption in trade.

There is little fluctuation in prices and they rule about as follows:

Georges Creek Big Vein.....	\$2.90 @ \$3.00
South Fork Miller Vein.....	2.90 @ 3.00
Clearfield (ordinary).....	2.75 @ 3.90
Somerset (ordinary).....	2.55 @ 2.70
Fairmont lump (ordinary).....	2.40 @ 2.50
Fairmont mine-run.....	2.15 @ 2.25
Fairmont slack.....	1.90 @ 2.00

BALTIMORE

Improvement expected in soft coal market in near future. Anthracite demand keen with little coal arriving. Export shipments show increase.

With prices holding firm the bituminous market bids fair to show some improvement in the near future. It is the view of the trade that while dealings con-

tinue to be confined practically to the spot market, the continued inquiry would make it appear that in the near future many consumers are going to get under cover. The warning that production is not going to be able to meet the demand of the future unless mines are kept working is being heeded by many, and this will doubtless help stabilize market conditions soon.

For the best grade of coals \$2.75 at tide was the high mark. This went as low as \$2.50, while for the medium grade fuels \$2.30 to \$2.40 were the best prices. The cheap grade of fuels was offered at as low as \$1.90 @ 2, but the buyers here decline to stock any fuel of the inferior grades. The market here is strong for the best grades.

The trade is somewhat agitated over reports sent out from Washington, which set forth that President Wilson favors Government control of coal, oil and gas. Leaders of the industry point out that any further Federal control of coal would sound the death knell of the industry, but there is a sort of feeling of relief in the fact that a Republican Congress holds the whip hand and will not permit any return to conditions of a war nature.

Exports during the week picked up somewhat, and 28,963 tons of cargo and 3700 tons of bunker coal left this port for other shores. Complaint is being made of the red tape surrounding the obtaining of a charter for bottoms for foreign use. As bottoms become more and more available it is expected to provide for the rapidly increasing foreign business here. Brazil, Argentina, Costa Rica, Italy and Sweden are some of the ports of destination of the vessels leaving this port. Foreign buyers had many feelers out, but no business was closed and the cargoes leaving port were taken from the spot market.

In the anthracite market there is little change. Receipts continue to be insufficient and there is no improvement in sight. Dealers continue to urge householders to place their orders for delivery despite the fact that the April business in some instances is not yet out of the way. There is being conducted an advertising campaign by some of the dealers to stimulate buying, even with the shortage.

Lake Markets

PITTSBURGH

Demand slightly improved. Consumers conserving remaining stocks. Steel mill consumption more promising. Slack easier.

There has been a slight improvement in the line demand for coal, and with a further increase in lake shipments production in the Pittsburgh district is somewhat heavier, being estimated at well above 50 per cent. of capacity.

The steel industry has not decreased its coal consumption any farther, as with larger bookings of steel orders in the past two or three weeks than for a long time it is tending to increase its mill operations, whereas since early in the year the trend of mill operation has been constantly downward.

There is no longer much drawing upon stocks for consumption, the disposition being to hold such stocks as remain. Consumers observe that they can buy coal for prompt shipment at lower prices than they can buy for deliveries through the winter. They have to choose between believing that the coal operators are altogether wrong in their price views, or using purchased coal now at the special prices and saving their stocks for later consumption.

Slack continues to grow easier, on account of heavy production due to the movement of 3-in. in the lake trade, and on steam slack the market is about 10c. easier on both steam and gas slack, while mine-run is unchanged. We quote: Best grades gas coal—Slack, \$1.70 @ 2; mine-run, \$2.35; 3-in., \$2.50 @ 2.60; 11-in., \$2.60 @ 2.70. Steam—Slack, \$1.60 @ 1.80; mine-run, \$1.90 @ 2.35, all per net ton at mine, Pittsburgh district.

BUFFALO

Slight improvement in bituminous. Not much prospect of a stir yet. Shippers confident. Industries moving slowly. Rush for anthracite. Lake shipments light.

Bituminous—The demand picks up a little here and there, but it is remarked by a leading jobber that nobody can sell coal from the office and it takes a good salesman to do much business on the road. Still there are those who do make fair sales and they are kept moving. Canada is buying a little more freely, but it all shows little more as yet than a running out of stock.

The movement of bituminous is about as formerly. Spotty conditions in the trade are reported by many jobbers. This usually precedes an increase of activity, but it may not happen right away. Still the general belief is that it will come before fall. Prices have sagged a little, but only slack shows any marked decline. Quotations: \$4.55 for thin-vein Allegheny Valley, all sizes; \$4.45 for 3 Pittsburgh and No. 8 lump; \$4.30 for same, 3 lump; \$4.05 for same, mine run, and \$3.65 for all slack, per net ton, f.o.b. Buffalo.

Anthracite—The trade is hampered by the continued light mining. Somehow the operators are unable to keep up with the demand. Either the lake or the all-rail trade would take most of what comes this way, and the local trade is also still large. Consumers hear that a winter shortage is likely and they are eager to buy. The advancing price is also a spur, but the distributors are not able to meet it. Probably this state of things will last nearly all summer, but if so the consumers will be much better supplied than they ever have been at the outset of cold weather and ought to be able to get along so much better.

The lake trade is showing the decline of mining more than even the failure to meet the local demand. City distributors now say, though, that they are able to fill all orders and do not believe they will increase again right away, unless some new scare is sprung on the public. The lake shipments declined to 48,225 net tons, of which 13,800 tons cleared for Chicago, 8300 tons for Fort William, 7800 tons for Duluth and Superior, 7300 tons for Sheboygan, 3425 tons for the Canadian Sault, 3400 tons for Milwaukee, 900 tons for the American Sault, 3300 tons for Manitowoc.

Freight rates remain at 52½c. to Chicago, 47½c. to Milwaukee, Manitowoc and Sheboygan, 42½c. to Duluth and Fort William, \$1 to the Sault.

CLEVELAND

The coal trade is reflecting the general improvement in business, and steam-coal users who for some months now have been indifferent are displaying interest. Slack is going more readily, while the lake trade is absorbing every ton arriving at Lake Erie docks. Prices, especially of domestic grades, are stiffening.

Bituminous—The operator without contracts today considers himself fortunate. In every quarter sentiment is the same—prices are going to advance steadily and a real shortage of coal threatens. Every day seems to bring forth new and larger inquiries, and the operator who has tied up a large part of his production in railroad fuel at \$2 to \$2.10 and lake coal at around \$2.35 and \$2.40 is wondering where he is going to get off. Surplus piles of slack will melt away much quicker than anticipated, and even in the face of the huge stocks at the mines some operators are figuring on putting in additional crushing equipment. The prediction is made that Dec. 1 will see slack quite short. As \$1.40 slack contracts are ending they are being replaced by \$1.50 and \$1.60 slack. Mine-run and prepared sizes also have become much firmer, and it is doubtful if much of either grade can be touched for less than 10 to 20c. higher than was asked a month ago. Almost frantic efforts have been made lately by some of the railroads to place \$2 coal, but their efforts have been fruitless. Increasing operations in the iron and steel and the rubber industries of northern Ohio insure a steadily advancing demand for coal.

The more domestic bituminous and Pocahontas is advanced the greater the demand that comes out. Forked Pocahontas now is quoted at \$9, net ton delivered, by the larger retailers and this figure represents a 75c. advance in six weeks. West Virginia splint also has been marked up, and now is quoted at \$7.75 to \$8. Dealers continue to do a winter business.

Lake Trade—Lake Erie car dumpers continue handling about 750,000 tons of bituminous, including vessel fuel, a week, which is a slight increase over the rate at this time last year. Coal is so much in demand in the Northwest that some of the large freighters are coming down light for coal, thus reversing the usual order. A large part of the coal that is going up the lakes has not yet been priced.

DETROIT

Demand for bituminous is light in both the steam and domestic branches of the trade, despite price concessions.

Bituminous—Unsatisfactory conditions are still reported in the bituminous coal trade in Detroit. Jobbers and wholesalers

say buyers are not showing the active interest in the market that should be developing to assure an adequate and equitable distribution of coal before winter. In their opinion affairs are shaping themselves toward a situation in the fall that will draw all the buyers into the market, bidding against each other for coal that the mines perhaps may be unable to supply, even at higher prices.

Users of steam coal, with a few exceptions, are holding back. The impression prevails among some of the jobbers that they are waiting in the expectation prices will be lowered as the summer advances. Such an expectation, the jobbers say, is certain to meet with disappointment. They look for an advance as a more probable development of the later season trade.

Though smokeless coal was one of the most popular forms of fuel in many Detroit establishments before the war, little of it is now obtainable. Lump and egg are said to be so rare in the local market that quotations of \$3.50@4 a net ton at the mines are conceded to be unobtainable. Small lots of mine-run are reported to bring \$2.75.

West Virginia gas and splint lump are quoted at \$2.75, mines; 3-in. lump at about \$2.50; mine-run at \$2.10@2.25, and slack at about \$1.85. For Hocking domestic lump the mine price is given as \$2.50; mine-run \$2, and slack \$1.50, while other coal from Ohio is said to be offered at about the same prices.

Anthracite—Household consumers seem to have forgotten their disappointments and trying experiences of the last two years in trying to get anthracite. The number of buyers stocking up for winter is not so large as dealers would desire. The supply of prepared sizes seems to be large enough to fill a greater number of orders than are being received.

Lake Trade—There is a moderately active movement of coal from mines to docks for lake shipment, but the supply is not sufficient to load all the carriers available and a loading total of 1,000,000 tons a week has not been attained this season. Inability to get downbound cargoes is causing some vessels to come down light for coal.

COLUMBUS

There is a good demand for smokeless and the better grades of domestic coal in central Ohio territory. Contracting for steam tonnage is still slow, owing to uncertainty in price. Lake shipments are becoming heavier as the season advances. A marked improvement is looked for in the near future.

Domestic users are heeding warnings that coal will likely be scarce next fall and are buying more liberally than formerly. This fact is stimulating the domestic trade, more especially in Pocahontas and West Virginia splints. Hocking and Pomeroy coal are also being bought more actively by dealers. Retail stocks are somewhat low for the time of the year, and dealers are inclined to stock up to a certain extent. Retail prices are still fairly well maintained, although some low quotations are being made. On the whole the domestic trade is becoming better and an improved tone to the trade is noted.

Steam business is still slow because of uncertainty as to the future. Reserve stocks are still being used and thus contracting is now active. Large users are able to buy coal in the open market in case they have no reserves. There is an oversupply of the small sizes, and that is the worst feature in the trade. The production of lump is restricted by the inability to dispose of screenings. Rubber plants are still pretty well supplied with fuel, and iron and steel plants are not disposed to contract.

The lake trade is becoming more active as the season progresses. Shipments at the lower lake ports are increasing from week to week. A large part of the shipments are made by concerns having their dock connections in the Northwest and the question of price does not enter into the transaction. Some agreements to move lake tonnage on a tentative contract have been made and a fair tonnage is going forward. The question of lake price is still unsettled although prices seem to be settling around \$2.35 for eastern Ohio 3-in. and about the same for Hocking and Pomeroy grades.

The output is fairly good in all of the producing fields of the state. This is especially true where lake tonnage is being mined. In the eastern Ohio field production is about 60 per cent. of normal. In the Hocking Valley and Pomeroy Bend fields it is about 60 to 65 per cent. Other fields

are not showing up quite so well as far as production is concerned.

Prices per ton delivered in Columbus are:

Hocking lump.....	\$5.50@5.75
Pomeroy.....	5.95
Pocahontas.....	7.00
Splints.....	6.00@ 6.25
White ash.....	6.25
Island Creek.....	6.25
Semi-smokeless.....	6.75
Wheeling Creek, Kentucky.....	6.75

CINCINNATI

Outlook is brighter. No contract business being sought as conditions in the future are being discounted now.

The outlook for the coal trade is brightening up somewhat. The uncertain business of the past few weeks is being replaced by trade of the firmer kind. There has been no exceptional demand for any grade in particular, however, all kinds moving in a satisfactory manner. Domestic grades have shown a decided improvement, and the Queen City coal men consider that this augurs well for the coal business.

The contract business has shown practically no activity, as has been the case in the past month or so. The coal men are not worrying about this, some of them, in fact, are not looking for this business at all. They claim that the state of the coal industry in the fall and winter of this year is quite uncertain, and they are anticipating some little trouble in the matter of transportation. They also claim that the labor conditions at the mine will be a little unsettled this fall, and taking these two items into consideration they are not really anxious for the contract business on a large scale.

The prices of lump coal at the mines are firmer. The movement of coal to the lakes and the northwest is reported as being comparatively light, but the belief is expressed that this trade will begin to pick up in the near future. The receipts from the mines during the past week have fallen off somewhat, but the local coal men say that they are in a position to take care of orders in a satisfactory manner, and no particular anxiety is being felt in regard to this item. The Hamilton County Commissioners have awarded the contract for coal for the different county institutions to the James P. Bolger Coal Co. The Bolger Company's bid was \$5.25 a ton for smokeless run-of-mine, \$4.90 for smokeless nut and slack, and \$4.49 for bituminous nut and slack.

LOUISVILLE

General movement from Kentucky mines improving, with domestic in excellent demand. Production showing steady increase, but reported to be held back slightly on account of labor shortage in eastern Kentucky field.

The demand for good block coal is better and is increasing somewhat, owing to a greater percentage of summer stocking orders from domestic consumers. Steam coals of all grades are draggy, spot coal being sold at low prices approximately, but contract coal is holding nicely. Low-grade coals are in poor demand in practically all sizes. The greater proportion of the stocking now being done is on high-grade block, as consumers are anxious to lay in sufficient stocks of good coal while it can be had.

It is claimed that with the improvement in demand the eastern Kentucky field is again feeling the effects of a short labor supply. It is held that until European labor is again imported there is not much prospect for any material improvement in the labor supply as a whole. Car supply is adequate, with all mines reporting full deliveries. Mines for the most part are working full time, but are not making full shipments. There is now a good movement to the Lake district, composed mostly of 2-in. and up block, which is increasing the difficulty in disposing of nut and slack. Railroad contracts have taken up a considerable volume of annual production, guaranteeing a fair tonnage and making for a higher and stronger market on contract coal.

A prominent producer and jobber of Louisville, in commenting on the general situation, in part said: "The United States will be in the grip of a coal famine within 90 days if coal production does not increase. Production is far below that of the war period, owing to several factors, chief of which is that the consumer is not buying coal. In eastern Kentucky many mines are short of labor, and western Kentucky mines are idle because of lack of business. Many miners in eastern Ken-

tucky who could work full time are loafing on the job and only putting in part time. Coal companies in the city are afraid to buy heavily because consumers are not stocking and are not taking the customary quantity of coal from the agents' hands."

Prices as a whole are fairly firm and slightly stronger, with average good eastern Kentucky grades quoted at \$3@3.25 per ton for block and \$2.25@2.40 for mine run. Nut and slack is selling on spot at \$1.50@2, with contract nut and slack quoted at \$1.85@2. Jellico block is quoted at \$3.35@3.50 and some good Blue Gem at \$3.75. Straight Creek being offered at around \$3.25. Western Kentucky is quoting block at \$2.25@2.55, and mine run at \$1.90@2.10, with nut and slack at \$1.50@1.85 and thin screenings at \$1.40 and up.

BIRMINGHAM

Shortage in domestic coal strengthens the market sharply, and when obtainable brings premium prices. Little or no change in actual sales of steam coal, though inquiries are more frequent and encouraging.

The fact that domestic grades of fuel are now so hard to obtain has resulted in the sales of such fuel being made at from 25 to 75c. per ton for the small tonnage available to the trade at this time. Most all of the domestic producers have sold up anticipated output through the year and dealers are now finding it next to impossible to place orders with brokers or at the mines. This scarcity applies to not only the best grades of domestic coal, but in a large measure to the medium and lower grades as well. Quotations effective June 1, based on the schedules arranged Apr. 1, providing for an advance of 10c. per ton each month through September, are as follows per net ton mines:

	Lump and Nut
Black Creek and Cahaba.....	\$3.95@4.60
Carbon Hill.....	3.25
Corona.....	3.50
Montevallo.....	5.60
Big Seam.....	3.00

There has been no change in the steam situation as regards business actually booked, but indications point to an improvement in the market at an early date. Inquiries are better and of a more encouraging tone and coal men anticipate a material betterment is near at hand.

Coke

CONNELLSVILLE

Second half furnace coke contract negotiations delayed by stiffer price views of operators. Production shows slight recovery.

Connellsville coke operators have become very stiff in their views as to prices of coke, particularly for the second half of the year. Unless the blast furnaces are willing to pay considerably higher prices for second half than they were expecting only very recently to pay, contract negotiations are likely to be blocked. Compromises might be effected by making contracts on a sliding-scale basis, pricing coke from month to month relative to the prevailing market price of pig iron, otherwise coke is likely to be bought and sold from month to month at such prices as have to be agreed upon.

As last week, the usual quotation on spot or prompt furnace coke is \$4, but there is less chance than formerly of shading this figure, and the lowest priced sale reported in the past week was \$3.85. Off grades might go for less, but there is little production of off grades. The plants regularly making lower grades are closed and those operating are careful to make the best coke possible. Spot foundry coke remains at \$4.50 for very ordinary brands, good brands readily commanding \$4.75 or \$5 as they have done right along.

Three weeks ago there seemed to be a prospect that many operators would offer second half furnace coke at \$4, a few, making the best brands, asking \$4.25, while furnaces seemed to expect to buy at about \$3.50. While they had been paying about \$4 for May deliveries against monthly adjustment contracts, and would probably have to pay the same for June, they expected the new half year to present different conditions. Operators, however, failed to name the expected quotations, and have

been indisposed to make any quotations, soliciting bids, while the furnaces do not care to make bids. In the past few days some operators have intimated they would consider a price in the neighborhood of \$5, and as that is out of the question from the furnacemen's viewpoint the contract situation will have to await further developments. It is a small matter, however, since between two-thirds and three-fourths of the region is closed anyhow. Many furnaces are out of blast and many of those running are using byproduct coke. No contract market is quotable, and the spot market is quotable at \$3.85@4 for furnace and \$4.50@5 for foundry, per net ton at ovens.

The "Courier" reports coke production in the Connellsville and Lower Connellsville region in the week ended May 24 at 108,073 tons, an increase of 24,789 tons over the preceding week, but a smaller tonnage than in any week prior to that ended May 10.

Buffalo—The trade is not improving. Local furnaces are all terribly slack, some of them practically shut down on account of the failure of iron to sell. At the same time it is noticed that the stock market shows a decided advance in the quotations of some of the securities. Ore is not moving any faster than formerly, so that much of the lake fleet will be idle soon unless an improvement sets in. Quotations remain weak at \$7.25 to \$7.60 for 72-hour Connellsville foundry, \$6.60 for 48-hour furnace, and \$6.10 for off grades.

Middle Western

GENERAL REVIEW

Business is picking up all along the line. The latest reports from our mid-western coal fields are all encouraging, so far as sales are concerned. The current demand for coal is good, as is the number of contracts reported closed.

As was expected, as soon as the big buyers of coal learned that the railroads were purchasing heavily, they came into the market and also showed a desire to cover their requirements with contracts. The result has been that an encouraging number of large tonnages have been sold, but it is rumored at figures more advantageous to the operators than the coal sold to the railroads.

In Michigan and perhaps Indiana, the majority of big steam plants have covered their coal requirements by contracts, which have been closed in the last few weeks. In one Michigan manufacturing center a careful investigation showed that practically all of the big steam users now get their coal on contract. It is probably a fact that at least 75 per cent. of the steam trade in Michigan and Indiana is covered by contracts. This situation is not true of Illinois, Iowa, Wisconsin and Minnesota, as probably less than 50 per cent. of the industries are covered. It is pretty generally thought that the states just mentioned will follow in the footsteps of Michigan and Indiana, as the general public is becoming more acquainted with the seriousness of the situation, and realizes that if it does not get its requirements covered soon it will undoubtedly have serious troubles over obtaining an adequate supply a little later.

It is now pretty widely known that the railroads have succeeded in purchasing their coal considerably below the figures set forth by the Fuel Administration. It is also well known that the railroads were unable to get any concessions from the steel manufacturers, and as a result have had to

pay the price on whatever purchases were made. This situation has taught rather a bitter lesson to local operators, and has shown them the advantages of a strong association. It is fairly well known that the railroads' tactics in purchasing Indiana coal have given a big setback to several operators' associations in the Indiana coal-producing districts. Already a number of operators who made special low prices to the railroads are regretting their action, and it is thought that these operators will continue regretting it as the season advances.

The proposed increase in freight rates on practically all coal used in this territory has raised a protest from the coal-consuming public. In fact, it has added some to the present unpopularity of the idea of government ownership for the railroads. The proposed increase, however, has had one beneficial result, in that it has stimulated buying, both by steam users and domestic trade. When the advances are in effect, the demand for coal will probably be so strong that the increase will have but little effect on the current market. The coal trade is now confidently looking for better business and indications are that the trade will not be disappointed.

CHICAGO

Price cutting on low-grade coals, but good grades bring maximum. Prepared sizes of Pocahontas hard to obtain.

Until a day or so ago, Chicago was having a very backward spring, with cold raw weather and plenty of rain. This stimulated both the domestic and steam situations and has forced considerable buying.

The Franklin County operators report much better business in Chicago and suburbs, and this is also true of the Indiana Fourth Vein operators. The coal from less favored districts continues to be a drag on the market, and some price cutting is reported. The high-grade coal prices remain firm, with no sign of weakening; in fact, on the contrary prices in some cases advance ten cents per ton on domestic sizes, effective June 1.

The Pocahontas situation is getting stronger every day, with many dealers offering to place orders for mine-run at \$3 mines, with few takers. Prepared sizes of either Pocahontas or New River are almost impossible to obtain, with prices firm at \$4.25 to \$4.50 f.o.b. mines.

The demand for southeastern Kentucky coals, especially from the Hazard district, continues strong, and prepared coal from that field is moving at from \$3.25 to \$3.50.

ST. LOUIS

Market is quiet on all sizes of steam and domestic. A little country business in evidence on threshing coal, but otherwise market is inactive.

June comes in under favorable auspices. The buyers seem to be awakening in a general way to the fact that coal is not going to be plentiful and easy to get from now on, and there is an inclination on the part of some few to get in under contracts. The largest piece of contract business reported the past week was that of the Light and Development Co., which went to the Big Muddy Coal and Iron Co. for approximately 105,000 to 110,000 tons of steam coal for its plants in St. Louis and southeast Missouri. The contract covers a period of one year. The prices were not made public.

Locally, the situation is bad. Little domestic coal has been ordered for storage so far, but indications point to June as a good storage month with the climax perhaps in July. There is a shortage of anthracite

in the St. Louis market, owing to the sudden demand for anthracite storage coal. The scarcity is principally noticeable in the egg size, and there is little hope held out for any great tonnage of this coal moving in for some time to come. A little Cartersville is being put away, but the business has not started as yet.

In the Standard field the mines continue to work one and two days a week and coal is selling below cost. Screenings have stiffened up a little, but not enough to justify any material advance in price. Many mines are loaded up with lump that has been on track for upward of two weeks. In the Mt. Olive field conditions are somewhat improved, but are not anywhere near being satisfactory.

A little railroad coal is moving out of both the Standard and Mt. Olive fields, but not in the volume that it should in view of what the condition is likely to be in the future.

In the Cartersville field of Williamson and Franklin Counties, as well as in Perry County, screenings are long. Many mines are unable to move their screenings, while domestic sizes, as well as the smaller sizes of nut, are in good demand. Working time is exceptionally good in these fields, everything considered. Cars are plentiful and service shows a little improvement.

The country demand for Illinois coal is better, especially from threshing section, and this is likely to continue for the next few weeks.

MILWAUKEE

Coal market enters upon summer stage of quiet. Deliveries increasing. Receipts of anthracite at a pause.

The coal market at Milwaukee has reached the summer stage of quiet, but deliveries are increasing, now that consumers are seemingly convinced that fuel prices will advance rather than decline as the season advances. No additional consignments of anthracite have reached port since last week's report, but soft coal stocks at the various yards have been increased by 111,340 tons. The total receipts of coal thus far since the opening of navigation foot up 158,539 tons of anthracite and 578,051 tons of bituminous. Last year the receipts up to June 1 represented 93,564 tons of anthracite and 389,547 tons of soft coal.

The City of Milwaukee will advertise for bids on the coal supply for various public institutions, between June 10 and 15. Last year the fuel for such use cost the city \$390,847.

General Statistics

NORFOLK & WESTERN TONNAGE

Below is a statement of the coal tonnage from mines on the Norfolk & Western R.R. and from other railroads, for the month of March, 1919:

From	Net Tons
Pocahontas Field.....	1,244,660
Tug River Field.....	255,581
Thacker Field.....	171,921
Kenova Field.....	68,089
Clinch Valley Field.....	81,838
Other Norfolk & Western Fields.....	4,212
Total Norfolk & Western Fields.....	1,826,301
Williamson & Pond Creek R.R.....	102,978
Tug River & Kentucky R.R.....	51,544
All other railroads.....	91,217
Grand total.....	2,072,040

Coal and Coke Securities

New York Stock Exchange Closing Quotations June 2, 1919

STOCKS		Bid	Asked	BONDS		Bid	Asked
American Coal Co. of Allegheny.....	(ACL)	45	...	Cahaba Coal, 1st Gtd. 6s, 1922.....		90	...
Burns Brothers, Com.....	(BB)	151	153	Clearfield Bituminous Coal, 1st 4s, Ser. A, 1940.....		71	...
Burns Brothers, Pfd.....	(BB)	100	115	Colorado Fuel & Iron, Gen. 5s, 1943.....		91	93
Central Coal & Coke, Com.....	(CK)	55	...	Colorado Indus. 1st Mtg. & Col. Tr. 5s, 1934.....		76	77
Central Coal & Coke, Pfd.....	(CK)	63	...	Consolidation Coal of Maryland, 1st Ref. 5s, 1950.....		87	92
Colorado Fuel & Iron, Com.....	(CF)	49	50	Lehigh Valley Coal, 1st Gtd. 5s, 1933.....		99	100
Colorado Fuel & Iron, Pfd.....	(CF)	105	125	Lehigh Valley Coal, Gtd. Int. Red. to 4%, 1933.....		79	...
Consolidation Coal of Maryland.....	(CGM)	75	...	Lehigh Val. Coal & Nav. Con. S. F., 4 1/2s, Ser. A, 1954.....		90	...
Elk Horn Coal, Com.....	(EH)	30	30	Pleasant Valley Coal, 1st S. F. 5s, 1928.....		80	...
Elk Horn Coal, Pfd.....	(EH)	...	47	Pocahontas Coal & Coke, Joint 4s, 1941.....		84	86
Inland Creek Coal, Com.....	(ICR)	39	...	Pocahontas Con. Collieries, 1st S. F. 5s, 1957.....		88	88
Inland Creek Coal, Pfd.....	(ICR)	75	...	Roch. & Pitts. Coal & Ir., Helvetia Pur. Money 5s, 1946.....		98	...
Jefferson & Clearfield Coal & Iron, Pfd.....	(JF)	60	...	St. L., Rocky Mnt. & Pac. Stamped 5s, 1955.....		...	83
New Central Coal of West Va.....	(NCC)	5	...	Tenn. Coal, Iron & R.R., Gen. 5s, 1951.....		92	95
Pittsburgh Coal, Com.....	(PC)	63	63	Utah Fuel, 1st Sinking Fund 5s, 1931.....		87	...
Pittsburgh Coal, Pfd.....	(PC)	95	97	Victor Fuel, 1st Mtg. Sinking Fund 5s, 1953.....		35	70
Pond Creek Coal.....	(PD)	17	18	Virginia Iron, Coal & Coke 1st 5s, 1949.....		85	88
Virginia Iron, Coal & Coke.....	(VK)	72	74				